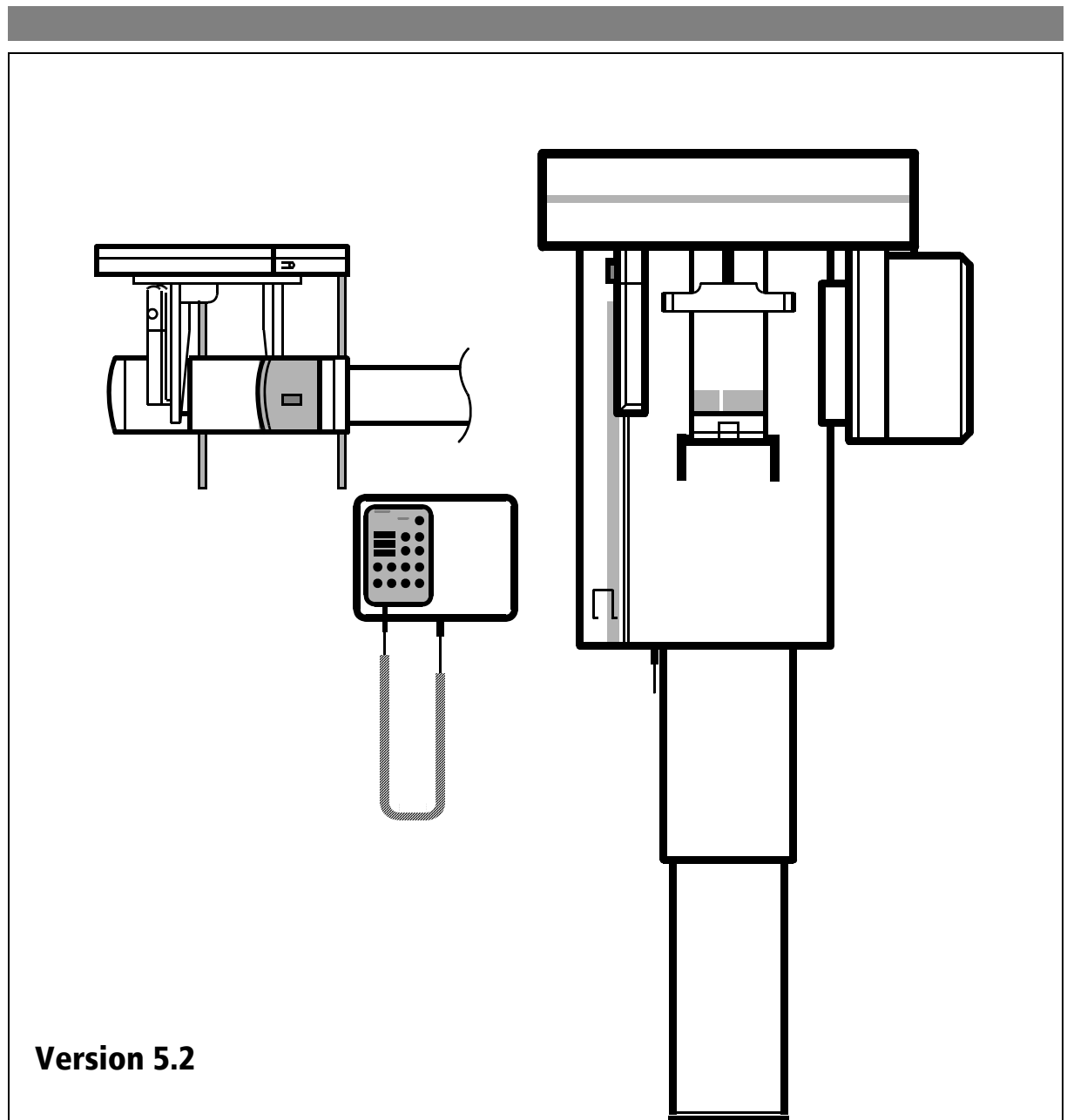


# ORTHOPHOS 5/Plus/Plus Ceph ORTHOPHOS Plus DS/Plus DS Ceph

Service Manual



## **The following are also required:**

- **Spare parts list**

Order no. 41 63 841

- **Circuit diagrams**

ORTHOPHOS Plus DS/Plus DS Ceph

Order no. 41 62 751

ORTHOPHOS 5/Plus/Plus Ceph

Order no. 54 71 839

- **Tools**

- Hexagonal-head screwdrivers, angled, sizes 1, 5, 2 – 10
- Allen key, size 4, length 200 mm, for socket head screws
- Set of hexagonal wrenches, sizes 4 – 14 with 1/4" ratchet, extension and 4 socket head (Allen) inserts 3 – 6 mm
- Spirit level
- Open-end wrenches, sizes 5.5, 7, 8, 10, 13, 30, and 19, 22 for Ceph
- Torx screwdrivers, sizes 10, 20, 25
- Phillips)-head screwdriver, size 1
- Insulated slot-head screwdrivers, sizes 0, 1, 2, 3, 4, 6
- Pliers for retaining ring

- **Auxillary means**

- Digital multimeter, accuracy class 1
- Soldering iron for cable repairs
- Diagonal cutter
- Cable ties
- Teflon insulating tape

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**Troubleshooting 3**

**Checks and Adjustments 4**

**Service Routines 5**

**Repairs 6**

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# 1 **Important Notes**

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# Important Notes

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## 1.1 Important Notes

- The ORTHOPHOS® Plus DS / Plus DS Ceph / 5 / Plus / Plus Ceph operates with the following nominal line voltages: 208 V, 230 V, 50/60 Hz. The permissible line voltage fluctuations are 230 V + 6%, -10%, and 208 V  $\pm$  10%. The internal line resistance must not exceed 0.8  $\Omega$ .
- Remote control  
The unit can be equipped with a remote control inside the treatment room or outside an X-ray room.  
For the tests the Multitimer can/must be removed from the remote control module and is to be connected directly to the unit (for remote control with the Multitimer without coiled cable, the coiled cable has to be connected for the tests according to the installation instructions).  
Remember that the fault can then be in the deactivated cable.
- Warm-up time, self-adjustment, cool-down time, turn-off time  
After power-up the unit always requires a warm-up time of one minute.  
During this time, the self-adjustment routine for the mechanical elements and electronics of the unit is executed. Pressing a key during the self-adjustment causes an error indication at the Multitimer and on the lateral operating panel. The cool-down time between two consecutive exposures is ensured by the automatic exposure blockage determined by the pulse/pause ratio. The count down of the waiting time required is indicated on the Multitimer. The turn-off time of board XAB-OP must be at least 60s; otherwise the unit will not function correctly (no exposure readiness).
- For demonstration units set the test switch S1/S88 on board DX31 to position 2. LED V3 must not light up. Pull plug X2. *Now, no X-ray radiation is generated.* Upon completion of the self-adjustment S.88 is indicated on the Multitimer → the forehead support has reached position 10.00.
- The overall software version of the unit is determined by the software versions of the EPROMs on board DX1 and of the Multitimer D4 as well as the version number of the memory card. Refer to the list of software versions. When switching the unit ON the versions are indicated on the Multitimer for about three seconds after the segment test.
- Interference of radio telephones with electromedical equipment  
The use of mobile telephones in the area of the medical practice or clinic is prohibited in order to ensure the operational reliability and safety of electromedical equipment. 
- Disposal  
The X-ray tube assembly contains a tube which can implode, a small amount of beryllium, a lead lining and some mineral oil.
- Removal of the unit, WARNING, risk of injury  
Prior to the disassembly and removal of the unit the transport safety screw must be screwed into the vertical column (see Installation Instructions). 
- Error messages  
Error messages are indicated on the Multitimer and on the lateral control panel.
- Help messages H if radiographic readiness is not reached  
Help messages are displayed on the Multitimer and on the lateral control panel.

## 1.1 Important Notes

- If you have to remove panels from the unit.

Refer to section "Removing panels".

With the panels removed, remember that incident direct sunshine or bright room light can cause unit malfunctions by activating the light barriers.

Therefore: Avoid direct sunshine and bright lighting above the unit!

NOTE: For ORTHOPHOS Plus DS TSA, take TSA image receptor out of side holder **before** removing the panels.

Remember when reattaching the panels:

Secure sheet metal covers with screws.

IMPORTANT: For reasons of EMC it is essential to insert all screws.

Reinstall all panels.

- Do not move the secondary diaphragm by hand or subject it to any stress when removing from the package.

- Measurements

Before connecting a measuring instrument, always switch the unit OFF.

Select the required current/voltage type and set the measuring range according to the expected value.

Carry out continuity tests only with the unit switched off.

If the release of several exposures with radiation is required for checking the measuring results, you must observe the specified cool-down intervals. This is ensured by the automatic exposure blockage (see Operating Instructions).

The pulse/interval ratio is 1:10, which means a 10 second pause has to follow after 1 second of radiation. This pulse/interval ratio is automatically guaranteed by the automatic exposure blockage.

However, preferable for the X-ray tube is a pulse/pause ratio of 1:20.

Adhere to the radiation protection guidelines before generating radiation.



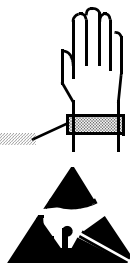
Test runs initiated by pressing the T key on the Multitimer followed by actuation of the exposure release button are executed without radiation, i.e. the kV/mA displays remain blank. I

- Replacing parts

Always turn the unit OFF before replacing any parts.

When parts located close to the line transformer are to be replaced, switch off the power at the distributor box for the on-site electrical system for safety reasons.

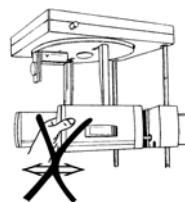
To protect electrostatic sensitive devices (ESD) on boards, always wear the wrist band found inside the unit.



The unit must be checked and newly adjusted following the replacement of the DX1 electronics, the X-ray tube assembly or a diaphragm.

The article numbers for ordering spare parts can be found in the spare parts list, order no. 41 63 841.

The figures in the spare parts list offer valuable assistance when replacing spare parts.



## 1.2 List of software versions

**IMPORTANT:**

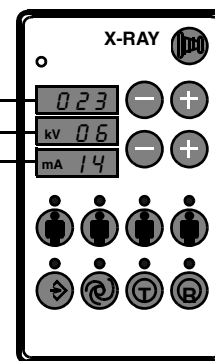
No other combinations of software are allowed since these could result in undefined faults.

## Multitimer

Versions no. memory card

Software Multitimer D4

Software board DX1



## ORTHOPHOS Plus DS / Plus DS Ceph

Unit identification e.g. 10

Overall software	DX1 EEPROM J115	DX1 EEPROM J115	D4 EEPROM J4	Memory Card	Memory Card TSA	SIDEXIS	Service- disk	Remarks
Version 02.1	013		06	18		2.2	1.0	
Version 02.2	013		06	20		2.2		
Version 02.3 10.96	013		06	21		2.2	2.0	
Version 02.4 12.96	013		06	22		2.2		
Version 02.4 02.97	013		06	22		2.21	2.1	
Version 02.5 06.97	014		06	23		2.21		Pulse/interval blockage 1:10. LEDs of ORTHOPHOS symbol are active during service routines.
Version 02.6 01.98	014		06	25		3.2 ≤ to 5.55	3.2	General update has been sent to all customers.
Version 02.7 06.98		20	06	26		3.2/4.2		
Version 02.8 01.99		20	06	27		3.2/4.2		Reduced kV/mA steps
Version 03.10 08.99		20	06	30.10		4.2		
Version 04.10 09.99		20	06	31.10		4.2/5.2		kV/mA steps adjustable
Version 05.10 11.00		20	06	35.10		5.28/5.3/ 5.5		Supports XAB-OP
Version 06.10 04.02		21	06	36.10		5.52/5.54		Correcting error E4 04/E3 48
Version 01.12 07.01		20	06		10.12	5.5		Supports TSA digital
Version 02.12 02.02		20	06		10.12	5.52		USB-Box
Version 03.12 05.02		21	06		11.12	5.52/5.54		Correcting error E4 04/E3 48
Version 03.12 08.02		21	06	36.10	11.12	5.55		

## ORTHOPHOS 5 / Plus / Plus Ceph

Unit identification e.g. 50

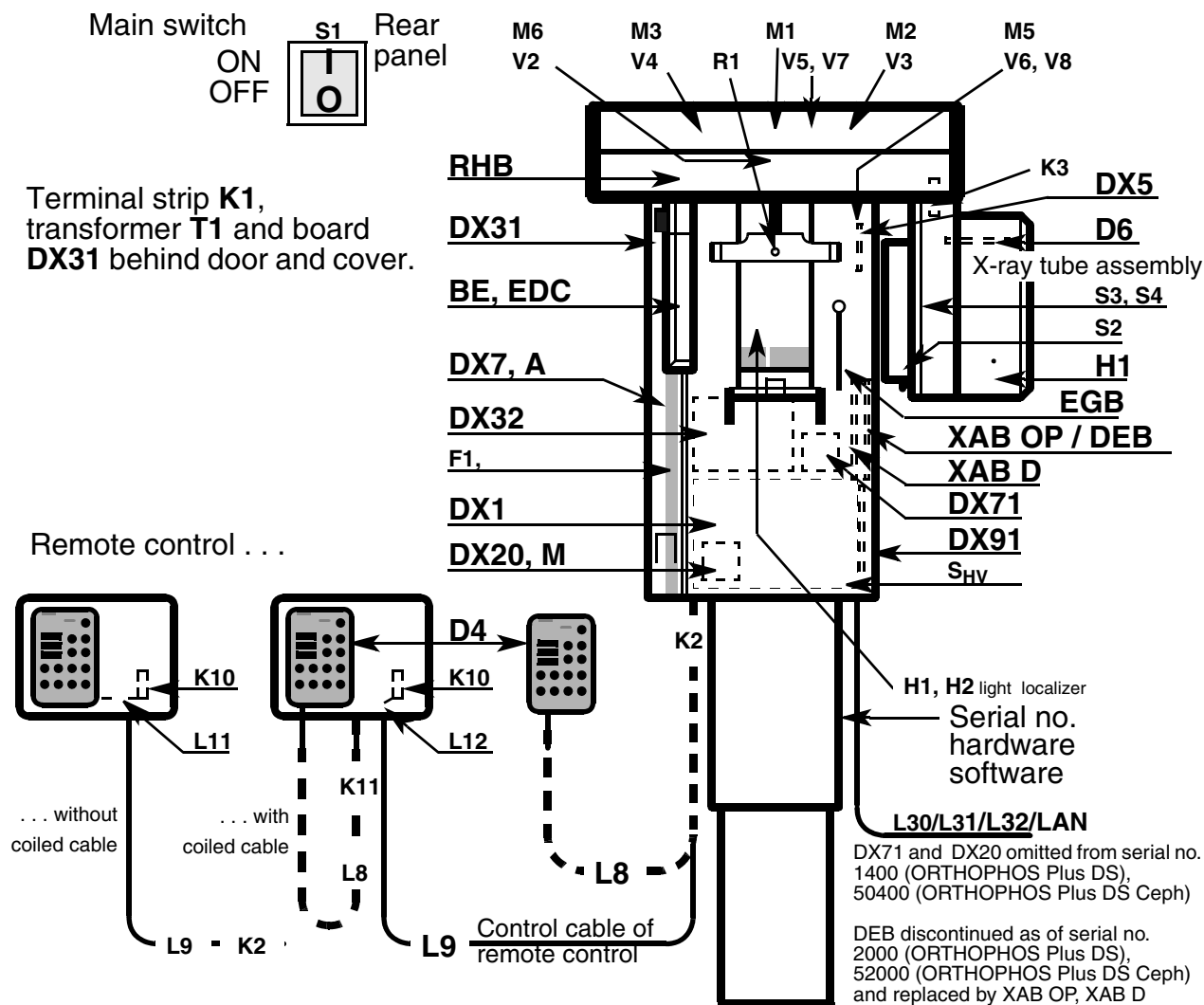
Overall software	DX1 EEPROM J115	D4 EEPROM J4	Memory Card ORTH. Plus	Memory Card ORTH.	Memory Card ORTH. TS	Remarks
Version <b>01.50</b>	020	06	011.50			
Version <b>01.51</b>	020	06		010.51		
Version <b>01.52</b>	020	06			010.52	
Version <b>02.50</b>	020	06	012.50			
Version <b>02.51</b>	020	06		011.51		
Version <b>02.52</b>	020	06			012.52	
Version <b>03.52</b>	020	06			013.52	
Version <b>04.50</b>	021	06	13.50			
Version <b>05.52</b>	021	06			014.52	

**ATTENTION!** Invalid data are indicated if DX1 switch S101 is in the wrong position.

## 1.3 Major Assemblies and Components

### 1.3 Major Assemblies and Components

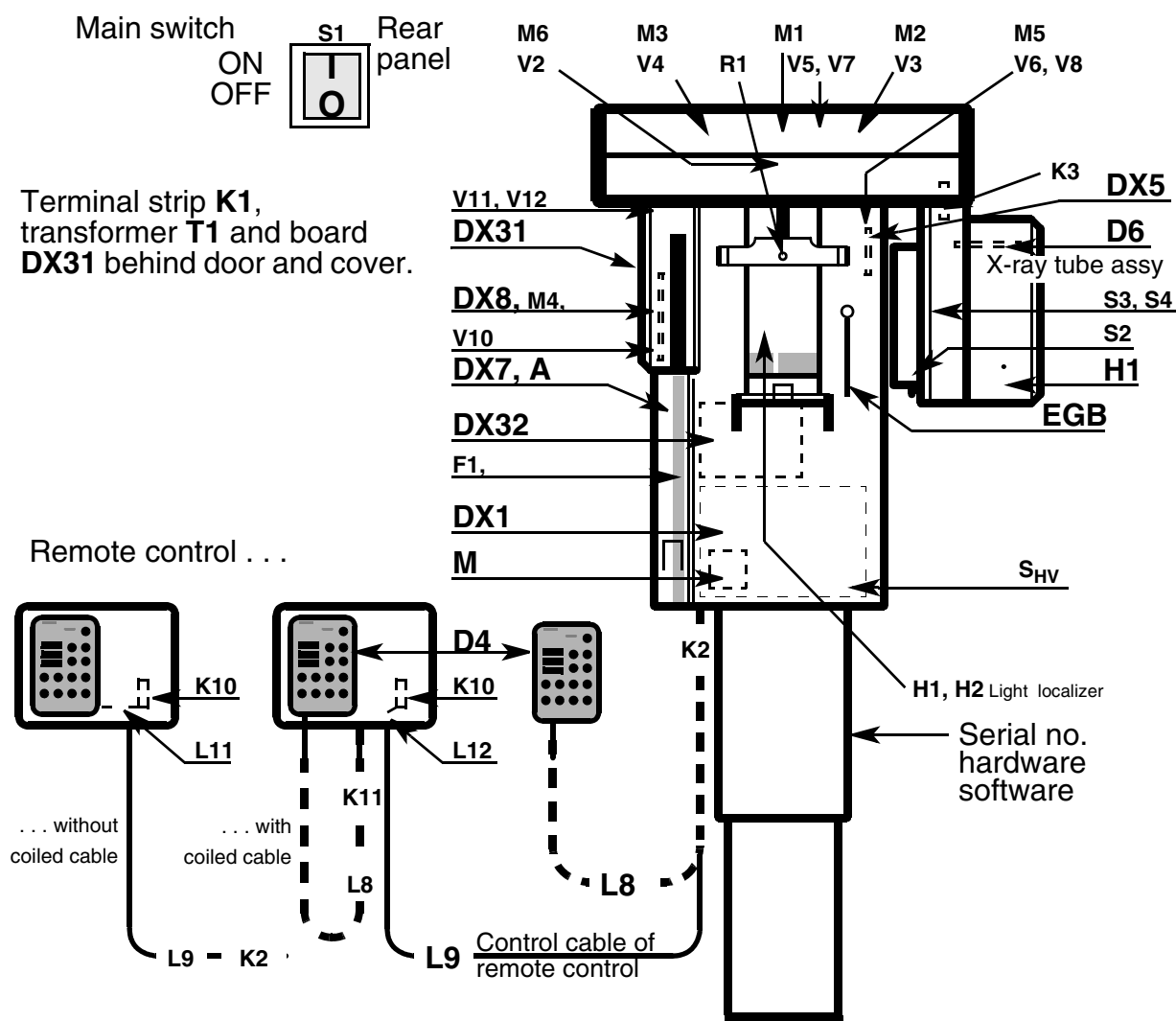
#### ORTHOPHOS Plus DS



A = Membrane keypad  
 BE = Image receptor  
 DEB, EDC,  
 RHB, D,  
 DX, XAB= PC boards  
 M = Memory card  
 H1 = X-ray tube assembly  
 F1, F2 = Main fuses  
 M1 = Motor for rotation  
 M2/3 = Actuators  
 M5 = Motor for height adjustment  
 M6 = Motor for forehead support movement  
 H1/H2 = Light localizer  
 K = Connector/terminal strips on/in the unit

L = Leads/cables  
 R1 = Potentiometer for forehead support  
 S = Switch  
 SHV = Correction switch for height adjustment  
 X = Connectors on boards  
 V2 - V8 = Light barriers  
 V2 = Forehead support, zero position  
 V3 = Start position for actuator M2  
 V4 = Start position for actuator M3  
 V5 = Start position for rotation  
 V6 = Height adjustment pulses  
 V7 = Rotation ring in Ceph position  
 V8 = Ceph synchronization pulses

## ORTHOPHOS PLUS

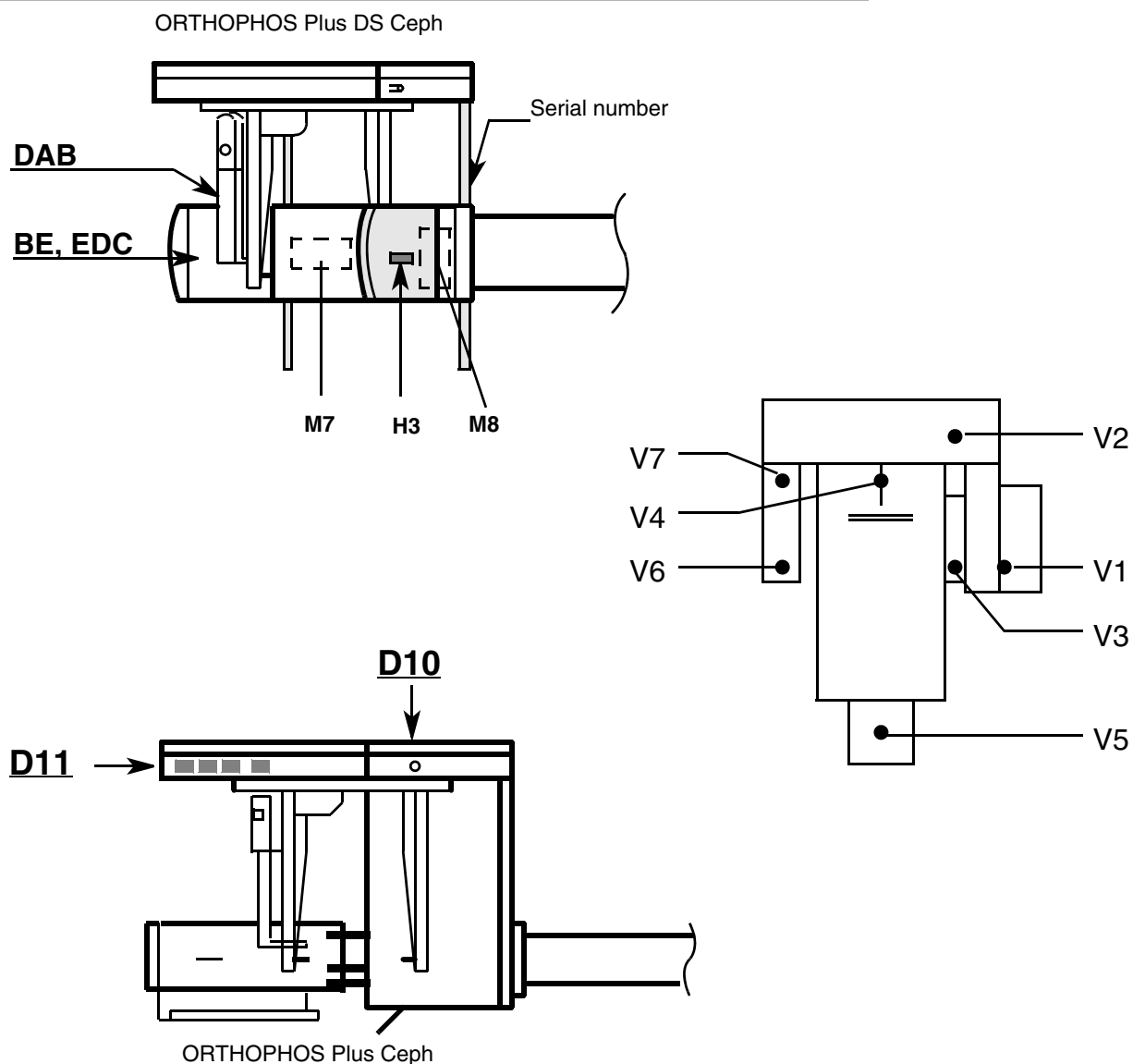


A = Membrane keypad  
D, DX = PC boards  
M = Memory card  
H1 = X-ray tube assembly  
F1, F2 = Main fuses  
M1 = Motor for rotation  
M2/3 = Actuators  
M4 = Motor for cassette movement  
M5 = Motor for height adjustment  
M6 = Motor for forehead support movement  
H1/H2 = light localizer  
K = Connector/terminal strip on/in the unit  
L = Leads/cables

R1 = Potentiometer for forehead support  
S = Switch  
SHV = Correction switch for height adjustment  
X = Connectors on boards  
V2 - V8 = Light barriers  
V2 = Forehead support, zero position  
V3 = Start position for actuator M2  
V4 = Start position for actuator M3  
V5 = Start position for rotation  
V6 = Height adjustment pulses  
V7 = Rotation ring in Ceph position  
V8 = Ceph synchronization pulses

## 1.3 Major Assemblies and Components

### ORTHOPHOS Plus Ceph and ORTHOPHOS Plus DS Ceph

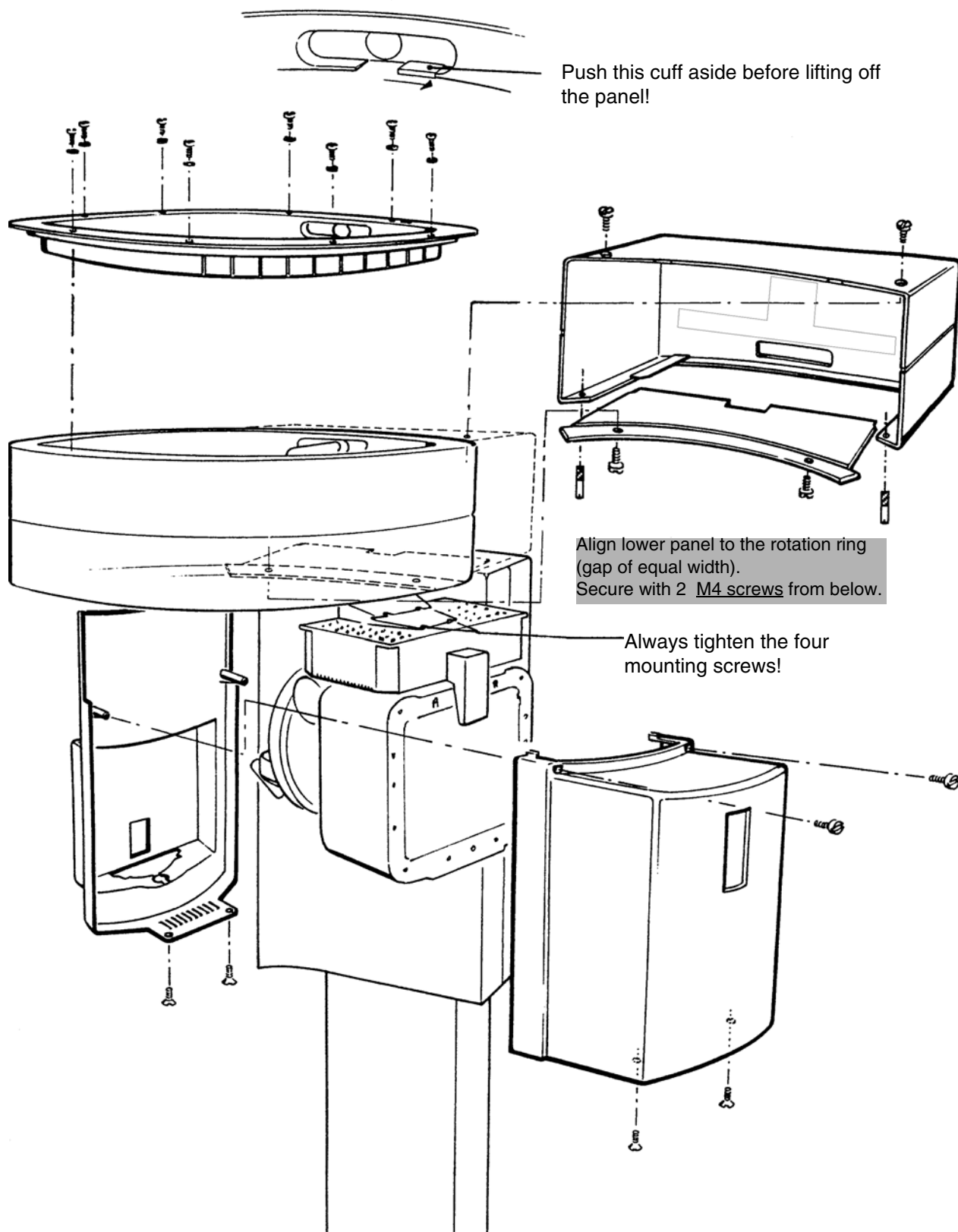


DAB = Image receptor supply board, Ceph  
 BE = Image receptor  
 EDC = Image receptor electronics  
 M7 = Motor for Cephalometer with brake and encoder  
 M8 = Motor for patient diaphragm  
 H3 = Light localizer  
 D10 = Control board  
 D11 = Control panel

LED indication of help messages  
 V1 = Cool-down interval  
 V2 = X-ray tube assembly position Pan / Ceph  
 V3 = Setting of diaphragm  
 V4 = Position of forehead support  
 V5 = Height adjustment  
 V6 = Image receptor plug-in position / exposed film inserted  
 V7 = Readiness for exposure SIDEXIS / cassette holder not in position

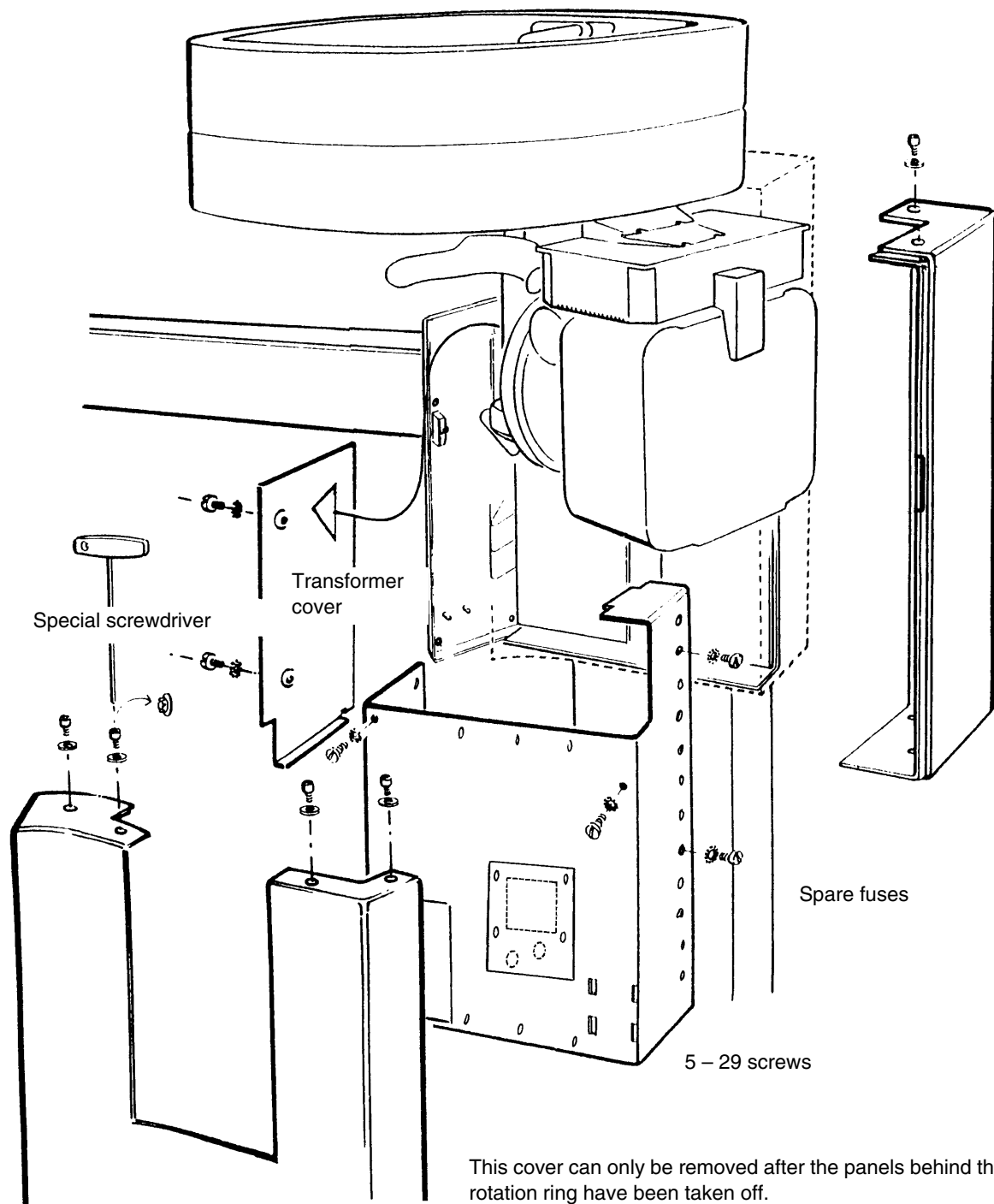
## 1.4 Removing Panels

X-ray tube assembly, rotation ring



## 1.4 Removing Panels

### Unit carriage



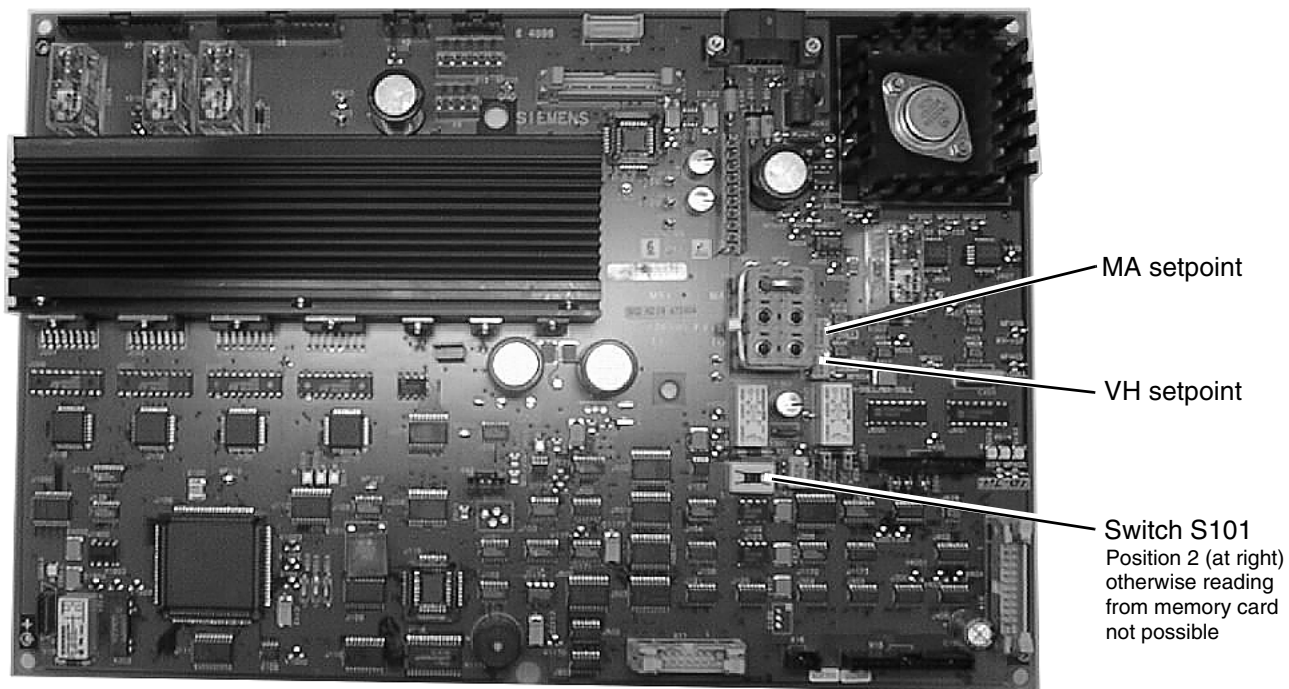
NOTE: For ORTHOPHOS Plus DS TSA, take TSA imagereceptor out of side holder **before** removing the panels.



## 1.5 Photographs of PC Boards

DX1 board

**33 13 108** with Memory Card 256kB



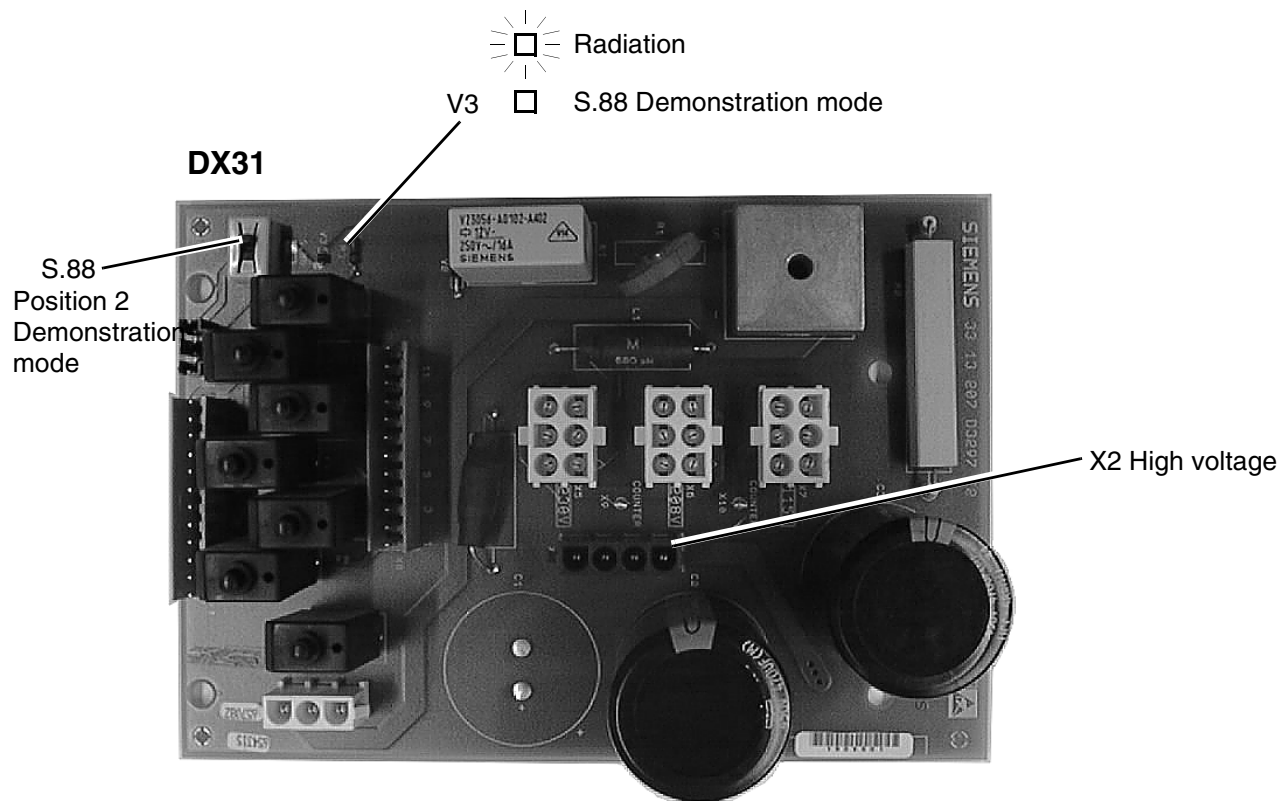
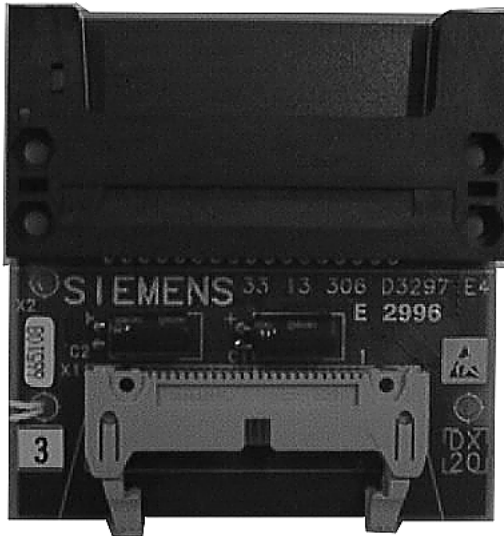
**51 67 080** with Memory Card 256KB or 2MB



## 1.5 Photographs of PC Boards

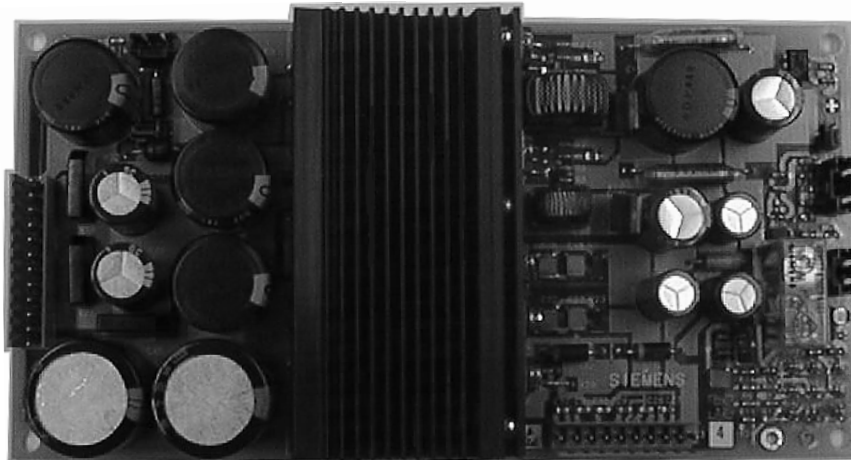
DX20 / DX31 boards

### DX20

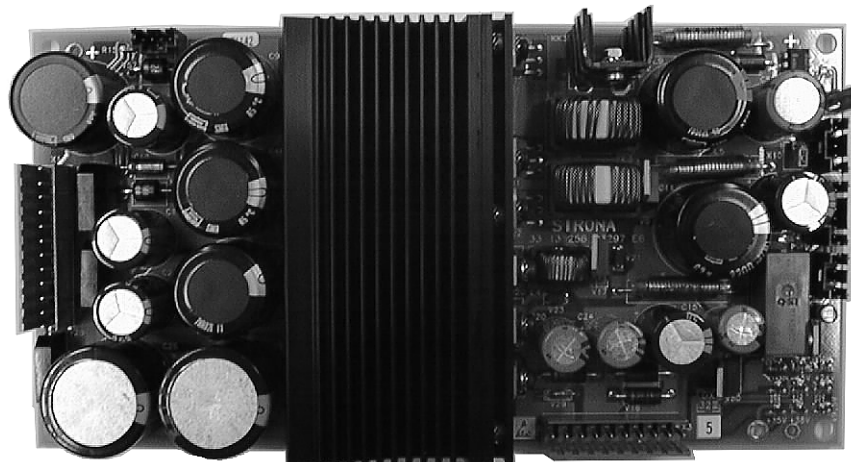


DX32 board

**DX32 E4**



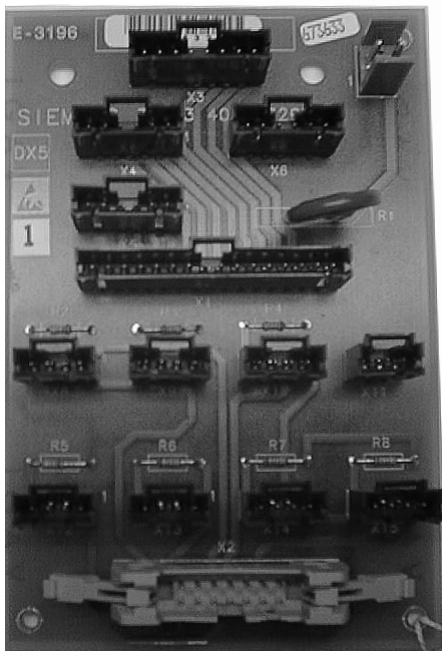
**DX32 E5**



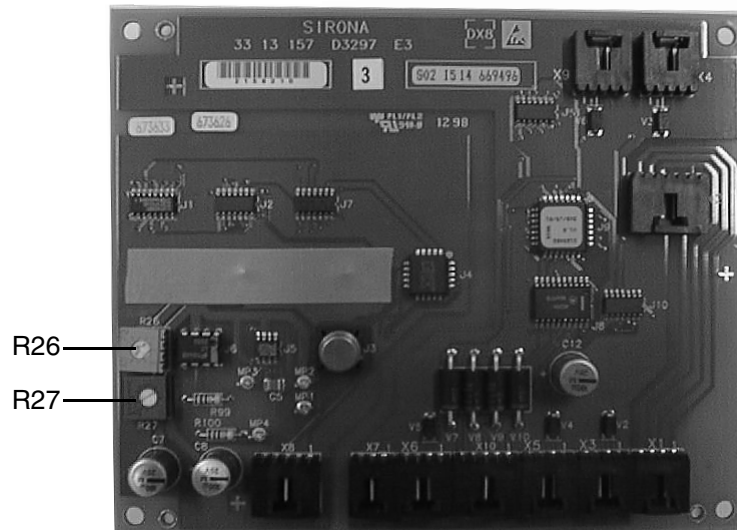
## 1.5 Photographs of PC Boards

DX5 / DX8 / DX91 boards

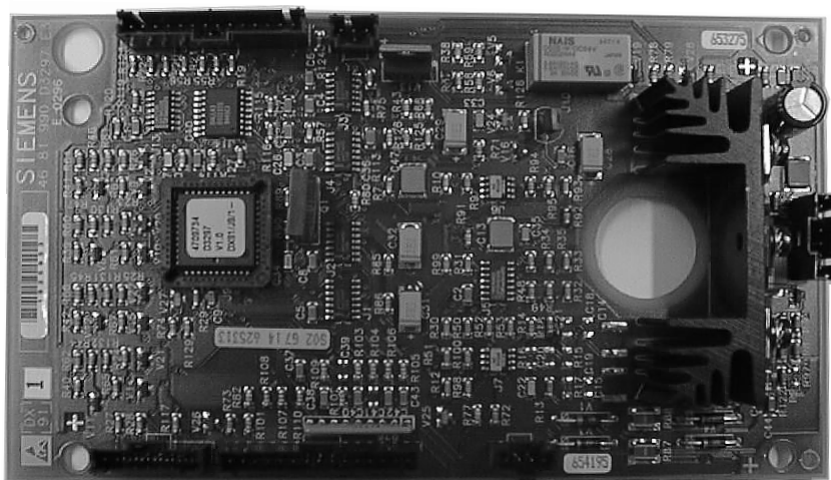
**DX5**



**DX8**

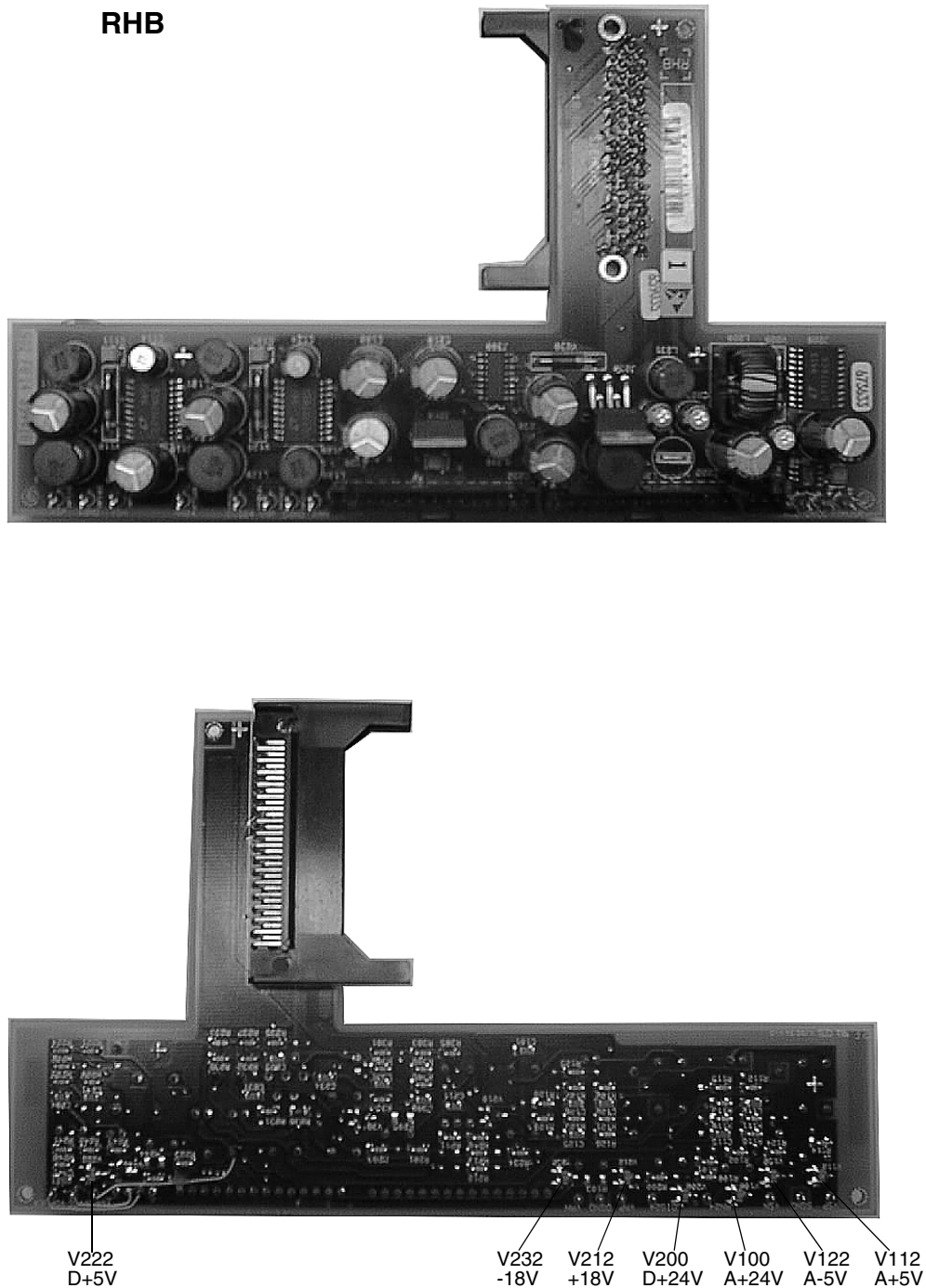


**DX91**



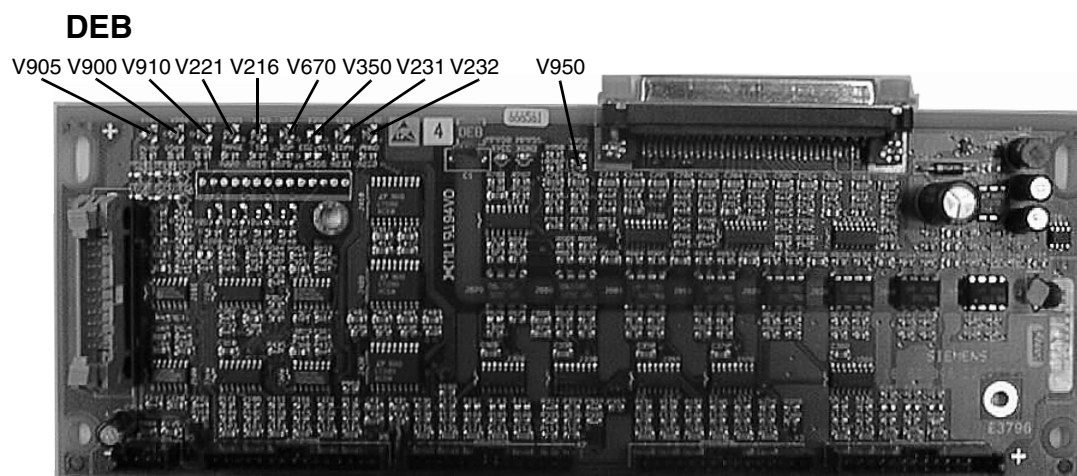
RHB board

RHB



## 1.5 Photographs of PC Boards

### DEB board

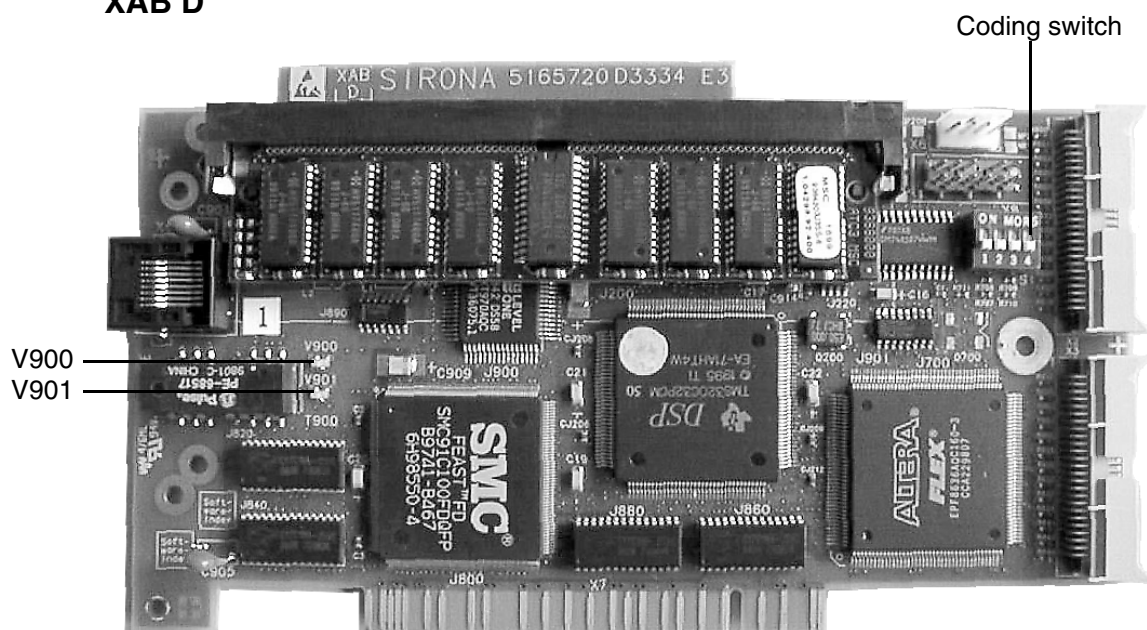


- V216 LED, Out clock pulses TDI
- V221 LED, radiographic mode
- V231 LED, Ceph radiography mode
- V232 LED, Panoramic radiography mode
- V350 LED, EDC Reset (not inserted)
- V670 LED, PC exposure readiness ACTIVE signal
- V900 LED, digital supply voltage RHB +24V
- V905 LED, analog supply voltage RHB +24V
- V910 LED, supply voltage DEB +5V ORTHOPHOS
- V950 LED, supply voltage DEB +5V PC (if XOP not correctly configured)

V905	V900	V910	V221	V216	V670	V350	V231	V232	V950	Status
		X						X	X	Standby Pan
		X					X		X	Standby Ceph
X	X	X						X	X	Panoramic radiography mode
X	X	X					X		X	Ceph radiography mode
X	X	X	X		X			X	X	Panoramic radiography mode Image generation test image
X	X	X	X		X		X		X	Ceph radiography mode Image generation test image
X	X	X	X	glows	X			X	X	Panoramic radiography mode X-ray
X	X	X	X	glows	X		X		X	Ceph radiography mode X-ray

XAB OP and XAB D boards

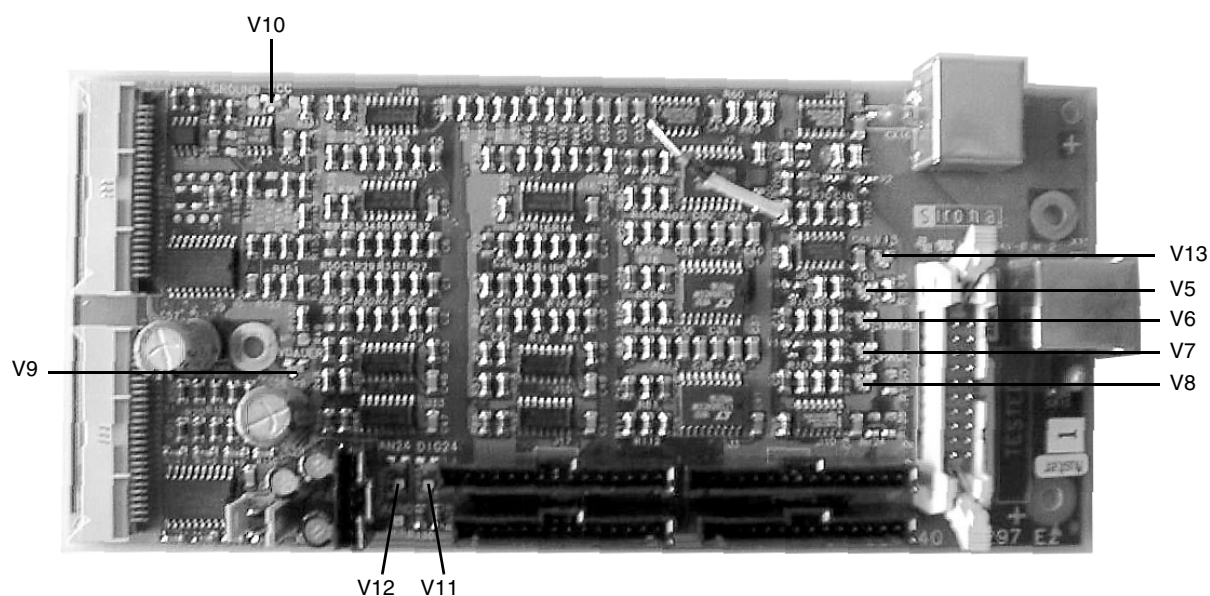
### XAB D



V900 = RD Transmit, GN Receive

V901 = RD Link (address recognition), GN 100Mbps (Megabits per sec)

### XAB OP



- V5 LED, TDI distance pulses
- V6 LED, IMAGE radiographic mode
- V7 LED, radiographic mode Pan/Ceph
- V8 LED, Panorama-Aufnahmemodus
- V9 LED, V continuous
- V10 LED, VCC +5V
- V11 LED, Digital supply voltage +24V
- V12 LED, Analog supply voltage +24V
- V13 LED, PC exposure readiness ACTIVE signal





## 2 **List of Messages**

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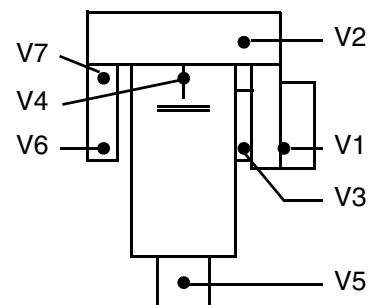
# List of Messages

## Contents

2.1	List of Help Messages .....	2 - 3
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2.3	List of Service Routines .....	2 - 9
2.4	List of Error Messages for SIDEXIS .....	2 - 10

If the **Ready LED** above the **R** key on the Multitimer flashes when you try to trigger an exposure, you can call up H3 help messages on the Multitimer:

- Press the **X-ray** key on the Multitimer.  
**CAUTION: Take radiation protection measures.**  
The **H3** . message then appears on the **kV/mA** display.
- Find in the following list the actions required to return the unit to readiness for exposure.
- Before carrying out the required action clear the help message by pressing the **R** key on the Multitimer.




























































	Help message	Description	Required action
Panorama	<b>H3 01</b>	Rotation unit not in the start position. <b>V2</b>	Press the Return key <b>R</b> ,  see page 3 - 11.
	<b>H3 02</b>	Film cassette not inserted or not engaged. <b>V7</b>	Slide loaded film cassette into the cassette tray until it engages. For error correction follow service routine S.16,  see page 5 - 45.
	<b>H3 03</b>	Exposed film cassette not replaced after last exposure. <b>V6</b>	Remove exposed film from the cassette and insert a fresh film.
	<b>H3 04</b>	Cassette holder not in Panorama position. <b>V7</b>	Swivel cassette holder to stop position. For error correction follow service routine S.16,  see page 5 - 45.
	<b>H3 05</b>	No Panorama diaphragm set with the diaphragm wheel. <b>V3</b>	Set diaphragm wheel to diaphragm for the selected program,  see page 3 - 13.
	<b>H3 06</b>	Locking button on diaphragm wheel not engaged (Panorama diaphragm). <b>V3</b>	Correctly engage locking button on diaphragm wheel,  see page 3 - 13.
	<b>H3 07</b>	Forehead support is in an incorrect position for the selected program. <b>V4</b>	Move forehead support to correct position,  see page 3 - 15.
	<b>H3 11</b>	Cassette holder not in Ceph position. <b>V7</b>	Swivel cassette holder to stop position. For error correction follow service routine S.16,  see page 5 - 45.
	<b>H3 12</b>	Rotation unit not in start position for cephalometry. <b>V2</b>	Drive rotation unit to cephalometry position (press <b>R</b> key) and lock it,  see page 3 - 17.
	<b>H3 16</b>	Ceph function not selected. <b>V3</b>	Select Ceph function by pressing the C key,  see page 3 - 19.
	<b>H3 20</b>	Radiographic data not acknowledged. <b>V7</b>	Acknowledge radiographic data with Return key <b>R</b> .
Ceph oder SIDEXIS	<b>H4 01</b>	Image receptor not inserted according to selected exposure. <b>V7</b>	Insert image receptor according to exposure set. For error correction follow service routine S.32/ S.33,  see page 5 - 77.
	<b>H4 03</b>	SIDEXIS not ready for exposure. <b>V6</b>	Make SIDEXIS ready for exposure. See SIDEXIS Service Manual.
	<b>H4 05</b>	Height adjustment not in the range for Ceph exposures. <b>V5</b>	Move stand without a patient to a position acceptable for cephalometry. For error correction follow service routine S.18,  see page 5 - 51.
	<b>H4 06</b>	Patient fixation on Ceph not in the basic position. <b>V5</b>	Move Cephalometer without a patient to position for cephalometry. If the error occurs repeatedly, correct by performing service routine S.34.1,  see page 5 - 83.
	<b>H4 10</b>	Image receptor not suitable for exposure set.	Replace the image receptor in the plug-in location according to the programmed acquisition.
	<b>H4 20</b>	Image could not be transferred to SIDEXIS.	Transfer exposure by SiRescue service program to the PC, see SIDEXIS User Manual. <b>CAUTION</b> Do not switch off the unit until the help message goes out.

**The above mentioned actions will eliminate help messages caused by operating errors.**







If the help message cannot be eliminated by the above actions, the fault is of another nature. Proceed with troubleshooting as described on the following pages.



























## 2.2 List of Error Messages

	Error message	Description	Required action
Multitimer	<b>E1 01</b> 	A key on the Multitimer was pressed during self-adjustment or is defective.	Proceed according to section "Correcting error E1 01",  see page 3 - 21.
	<b>E1 02</b>  <b>E2 03</b> 	Signal paths to control board D1 are interrupted.	Proceed according to section "Correcting error E1 02",  see page 3 - 21.
	<b>E1 03</b>	Faulty communication with the unit.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer.
X-ray tube assembly E2 . . .	<b>E2 01</b> 	Appears upon pressing the exposure button. Overheated X-ray tube assembly, pulse/pause ratio not observed. See LED Orthophos symbol.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer. Allow the X-ray tube assembly to cool down. If the error message reoccurs, proceed according to section "Correcting error E2 01",  see page 3 - 23.
	<b>E2 03</b> 	See E1 02	 see page 3 - 21
	<b>E2 04</b> 	Zero power range has been re-initialized.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer. Unfortunately, the freely programmed values will be lost. and must be reprogrammed. If not possible: correct the error with E2 04,  see page 3 - 25.
	<b>E2 10</b> 	Max. radiation time of the program exceeded.	Only possible in service mode; acknowledge the fault by pressing the <b>R</b> key on the Multitimer. Or Ceph mode is too slow: proceed according to section "Correcting error E2 10",  see page 3 - 27.
	<b>E2 11</b> 	kV <sub>max</sub> . (tube voltage) exceeded.	Proceed according to section "Correcting error E2 11",  see page 3 - 29.
	<b>E2 12</b> 	mA <sub>max</sub> . (tube current) exceeded.	Proceed according to section "Correcting error E2 12",  see page 3 - 31.
	<b>E2 13</b> 	VH <sub>max</sub> . (filament voltage) exceeded.	Proceed according to section "Correcting error E2 13",  see page 3 - 33.
	<b>E2 14</b> 	Short-circuit of an output stage on D6 with voltage/frequency converter on DX1 deactivated.	Proceed according to section "Correcting error E2 14",  see page 3 - 35.
	<b>E2 15</b> 	VH <sub>max</sub> . continuously present.	Proceed according to section "Correcting error E2 15",  see page 3 - 37.
	<b>E2 16</b> 	kV <sub>actual</sub> cable is interrupted.	Proceed according to section "Correcting error E2 16",  see page 3 - 39.
	<b>E2 18</b>	Non-localizable fault in obtaining the DC/AC signals.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer. If fault reoccurs, DX1 board is defective → replace. Perform "Adjusting board DX1",  see page 4 - 39.
	<b>E2 20</b> 	Occurs upon pressing the exposure button e.g. with the X-ray room door contact open - exposure release lead in the Multitimer cable is broken.	Close X-ray room door. Acknowledge the fault by pressing the <b>R</b> key on the Multitimer. If the fault reoccurs, proceed according to section "Correcting error E2 20",  see page 3 - 41.
	<b>E2 35</b>	Invalid data in the data memory.	Erase data in the EEPROM with 'Service Routine 09'. Then press the <b>R</b> key. If the message reoccurs, DX1 board is defective → replace and perform "Adjusting board DX1",  see page 4 - 39.
	<b>E2 40</b> 	VH setpoint out of tolerance ± 10 %.	Proceed according to section "Correcting error E2 40",  see page 3 - 45.


















	Error message	Description	Required action
X-ray tube assembly E2 . . .	<b>E2 41</b>	kV setpoint out of tolerance $\pm 5\%$ .	Adjust board DX1. If not possible, DX1 board is defective → replace and adjust,  see page 4 - 39.
	<b>E2 42</b>	mA setpoint out of tolerance $\pm 5\%$ .	Adjust board DX1. If not possible, DX1 board is defective → replace and adjust,  see page 4 - 39.
	<b>E2 43</b>	VH actual value out of tolerance $\pm 10\%$ .	Adjust board DX1. If not possible, DX1 board is defective → replace and adjust,  see page 4 - 39.
	<b>E2 44</b>	kV actual value out of tolerance $\pm 10\%$ .	Adjust board DX1. If not possible, DX1 board is defective → replace and adjust,  see page 4 - 39.
	<b>E2 45</b> 	mA actual value out of tolerance $\pm 10\%$ .	Proceed according to section "Correcting error E2 45",  see page 3 - 47.
	<b>E2 46</b>	Error while increasing or decreasing the kV value.	Software error or DX1 board defective → replace and perform "Adjusting board DX1",  see page 4 - 39.
	<b>E2 47</b>	Incorrect setpoint value after automatic setpoint adjustment.	Adjust board DX1. If not possible, DX1 board is defective → replace and perform "Adjusting board DX1",  see page 4 - 39. EEPROM defective.
	<b>E2 48</b>	Faulty user offset while increasing the kV value.	Acknowledge the fault by pressing the <b>R</b> key. Caution: If the offset was changed by the user (possible in the range from -6 to +3) it will be reset to zero. If the fault reoccurs, the DX1 board is defective → replace and perform "Adjusting board DX1",  see page 4 - 39.
Unit E3 . . .	<b>E3 01</b>  <b>E3 02</b> 	Operating element for light barrier V3 of actuator M2 has not left/reached the tripping position.	Proceed according to section "Correcting error E3 01/02",  see page 3 - 49.
	<b>E3 03</b>  <b>E3 04</b> 	Operating element for light barrier V4 of actuator M3 has not left/reached the tripping position.	Proceed according to section "Correcting error " E3 03/04",  see page 3 - 51.
	<b>E3 05</b>  <b>E3 06</b> 	Cassette carriage has not left/reached the reference point.	Proceed according to section "Correcting error E3 05 /06",  see page 3 - 53.
	<b>E3 08</b>	Fault in film motor counter.	Acknowledge the fault by pressing the <b>R</b> key. If the fault reoccurs, the DX1 board is defective → replace and perform "Adjusting board DX1",  see page 4 - 39.
	<b>E3 09</b> 	Pulses for height adjustment are not within the allowed time.	Proceed according to section "Correcting error E3 09/E4 03",  see page 3 - 55.
	<b>E3 10</b>  <b>E3 11</b> 	Count for height adjustment too high/too low for reference setting.	Proceed according to section "Correcting error E3 10/11",  see page 3 - 59.
	<b>E3 12</b> 	Key for height adjustment $\uparrow\downarrow$ was pressed during self adjustment or is defective.	Proceed according to section "Correcting error E3 12",  see page 3 - 61.
	<b>E3 21</b>	Key for anomaly <b>A</b> (control panel A) was pressed during switch-on procedure or before completion of unit self-adjustment.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer or the key/lead is defective.
	<b>E3 22</b>	Key for light localizer (control panel A) was pressed during switch-on procedure or before completion of unit self-adjustment.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer.

## 2.2 List of Error Messages – Continued






	Error message	Description	Required action
Unit E3 . . .	<b>E3 23</b>	Return key <b>R</b> on control panel A was pressed during the switch-on procedure or before completion of unit self-adjustment.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer.
	<b>E3 24</b>	""X-Ray Control"" is indicated at switch-on.	a) If error message occurs in combination with E1 02: button was recognized on Multitimer as actuated - check buttons or replace Multitimer. b) If error message occurs alone, pull out Multitimer and switch on again. If error message occurs again: DX1 defective → replace and perform "Adjusting board DX1", see page 4 - 39. If error message no longer occurs: replace Multitimer.
	<b>E3 25</b>	Incorrect data for exposure control.	Memory card or DX1 defective → replace and perform "Adjusting board DX1", see page 4 - 39.
	<b>E3 26</b>	Data in EEPROM not compatible with software version of memory card.	Check for compatibility of software versions according to the list, see page 1 - 5. Install the correct software combination, or the memory card or DX1 is defective. Adjust unit identification with Service routine S.17, see page 5 - 49.
	<b>E3 27</b>  <b>E3 28</b> 	Zero point of forehead support was not exited/reached.	Proceed according to section "Correcting error E3 27/28/29", see page 3 - 63.
	<b>E3 29</b>	Software limit switch of forehead support was reached before zero point.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer.
	<b>E3 30</b>	Counter IC of forehead support not counting correctly.	DX1 board defective → replace and perform "Adjusting board DX1", see page 4 - 39.
	<b>E3 31</b>	One of the keys ← → for forehead support adjustment was pressed during switch-on procedure or before completion of unit self-adjustment.	Acknowledge the fault by pressing the <b>R</b> key on the Multitimer. Key defective?
	<b>E3 32</b>  <b>E3 33</b> 	Start position for rotation was not exited/reached.	Proceed according to section "Correcting error E3 32/33", see page 3 - 65.
	<b>E3 35</b>	Rotation counter not counting correctly.	Software error or DX1 board defective → replace and perform "Adjusting board DX1", see page 4 - 39.
	<b>E3 36</b> 	Cassette holder was swivelled from the Pan position during the Pan exposure.	Proceed according to section "Correcting error E3 36", see page 3 - 69.
	<b>E3 37</b> <b>E3 38</b>	Counter IC of actuators not counting correctly.	DX1 board defective → replace and perform "Adjusting board DX1", see page 4 - 39.
	<b>E3 39</b> 	Light barrier for Ceph position rotation indicates invalid status.	Proceed according to section "Correcting error E3 39", see page 3 - 73.
	<b>E3 41</b>	Error with counter for kV increase.	DX1 board defective → replace and perform "Adjusting board DX1", see page 4 - 39.
	<b>E3 42</b>	Rotation has not reached Ceph position.	Light barriers V7/V8 maladjusted/defective.
	<b>E3 43</b>	Error with counter for radiation times.	DX1 board defective → replace and perform "Adjusting board DX1", see page 4 - 39.
	<b>E3 45</b>	Diaphragm inserted not recognized.	After service routine 09, after replacing DX1 or EEPROM → reprogram the diaphragm. Check function of diaphragm switch!

	Error message	Description	Required action
Unit E3 . . .	<b>E3 46</b> 	Position of cassette holder cannot be determined.	Proceed according to section "Correcting error E3 46",  see page 3 - 75.
	<b>E3 47</b>	Memory card not inserted.	Insert memory card.
	<b>E3 48</b>	Memory card which is plugged in is not valid or is not always detected.	If the error message occurs frequently, order conversion kit: Replace memory card and GAL J1121.
	<b>E3 49</b>	Watchdog reset performed.	Acknowledge the fault by pressing the R key. Fault occurs with voltage fluctuations; if reoccurring frequently: DX32 or DX1 board is defective → replace and perform "Adjusting board DX1",  see page 4 - 39.
	<b>E3 50</b>	This service exposure is not possible in the demonstration mode.	Deactivate demonstration mode. Turn test switch S1/S88 on DX31 to position 1. V3 on DX31 must light up. Observe section "Demonstration mode cannot be switched ON/OFF",  see page 3 - 9.
	<b>E3 51</b> 	Inaccurate signals indicated by the film drive control.	Proceed according to section "Correcting error E3 51",  see page 3 - 77.
	<b>E3 52</b>	Unit identification does not match the inserted memory card.	Always perform service routine S.17 when replacing DX1 or changing from ORTHOPOS 5 to Plus or TS or DS,  see page 5 - 49.
	<b>E3 53</b>	Switch S101 in left-hand position.	Turn switch S101 to right-hand position.
Ceph or SIDEXIS	<b>E4 01</b> 	Exposure aborted by SIDEXIS.	Proceed according to section "Correcting error E4 01",  see page 3 - 79.
	<b>E4 02</b> 	Fault indicated by control unit of Ceph motor.	Proceed according to section "Correcting error E4 02",  see page 3 - 83.
	<b>E4 03</b> 	Light barrier for Ceph control not emitting any pulses.	Proceed according to section "Correcting error E4 03/E3 09",  see page 3 - 87.
	<b>E4 04</b> 	Motor for secondary diaphragm not moving.	Proceed according to section "Correcting error E4 04",  see page 3 - 89.
	<b>E4 06</b> 	Fault at one of the supply voltages.	Proceed according to section "Correcting error E4 06",  see page 3 - 93.
	<b>E4 07</b>	Fault in TDI pulse generation.	DX1 board defective → replace and perform "Adjusting board DX1",  see page 4 - 39.
	<b>E4 08</b> 	Aborted by SIDEXIS during radiation.	Proceed according to section "Correcting error E4 08",  see page 3 - 97. In service program → make SIDEXIS ready for exposure; factory service 2.
	<b>E4 09</b> 	Fault at limit switches of Ceph drive.	Proceed according to section "Correcting error E4 09",  see page 3 - 105.
	<b>E4 10</b>	Communication fault with image acquisition card XOP (in PC) or XAB OP (in ORTHOPHOS).	With image acquisition card XOP: check cable L30/L31 and DEB board. With XAB OP: XAB OP does not respond or has crashed. Switch unit off and on again. Or not in correct service mode in SIDEXIS.
	<b>E4 11</b> 	Image receptor not ready for exposure.	Proceed according to section "Correcting error E4 11",  see page 3 - 107.
	<b>E4 12</b>	Image receptor is not logged in.	Load contents of image receptor floppy.
	<b>E4 13</b>	Pan image receptor in Ceph plug-in position.	Insert Ceph image receptor in Ceph slot.
	<b>E4 14</b> 	Ceph holder not moving (Ceph Pot.)	Proceed according to section "Correcting error E4 14",  see page 3 - 115.

## 2.2 List of Error Messages – Continued

	Error message	Description	Required action
Ceph or SIDEXIS	<b>E4 15</b> 	Ceph holder has not moved to limit switch.	Proceed according to section "Correcting error E4 15",  see page 3 - 119.
	<b>E4 16</b> 	Active signal present when switching ON.	Check SIDEXIS readiness for exposure. With XOP board: Check line path from XOP board in PC to DEB/DX1 board. With XAB OP board: Check line path from DX1 board to XAB OP board. Proceed according to section "Correcting error E4 16",  see page 3 - 121.
	<b>E4 17</b>	Software versions of DX1 and XAB OP boards are not compatible.	Establish a valid software combination by replacing the memory card; load a new XAB-OP software version (see SIDEXIS service manual); SIXABCON description.
	<b>E4 18</b>	Image receptor could not be addressed prior to exposure.	Proceed according to section "Correcting error E4 11",  see page 3 - 107.
	<b>E4 19</b>	A software download of XAB OP is performed (no acknowledgement of error message possible).	Wait until the 4 LEDs above the patient symbols start flashing; then switch the unit off. Software download is completed.
	<b>E4 21</b>	The XAB OP is in the initialization phase (Boot Service) (proceed as described in SIDEXIS service manual; SIXABCON description). The XAB OP has no valid IP address.	After a valid IP address has been assigned by SIXABCON the error message can be acknowledged on the unit (R key).
	<b>E4 30</b>	The image receptor has an initialization error or incorrect setting data.	Read out error memory of EDC, replace image receptor if necessary. Check installation of SIDEXIS.
	<b>E4 31</b>	Error on sensor adjustment of TSA image receptor.	Perform service routine S.32, test step 06.
	— — —	Indication at Multitimer. Communication between control board DX1 and Multitimer / board D4 is faulty.	Check mains voltage and terminal strip K1. Check Multitimer cable. Measure supply voltage at DX1 X1; if OK, DX1 board is defective; if not, DX31, DX32 or cable is defective.
	— — —	Indication for height adjustment: Height adjustment data not present.	Press key  or  : error message E3 10  or E3 11  .  E3 10  : unit above the correction switch. Press R key on Multitimer. Press  key until the height indication appears.  E3 11  : unit below the correction switch. Press R key on Multitimer. Press key  until the height is indicated.
	— — — — — —	Indication at Multitimer and indication for height adjustment simultaneously.	DX1 board is defective  replace and perform "Adjusting board DX1",  see page 4 - 39.



Service routine	Description	When required
<b>S.01</b> 	Radiation without rotation	All adjustments of X-ray tube assembly, e.g. acceptance testing, functional test, head adjustment, diaphragm adjustment.
<b>S.02</b> 	Radiation without rotation for Ceph	See <b>S.01</b> .
<b>S.03</b> 	Adjustment of kV setpoint, mA setpoint and VH setpoint	After replacing the DX1 board, or malfunction of the X-ray tube assembly.
<b>S.04</b> 	Test of actual values kV, mA, VH.	After replacing DX1 or X-ray tube assembly.
<b>S.05</b> 	Heating adjustment	After replacing DX1 or X-ray tube assembly.
<b>S.06</b> 	Reading/deleting the radiation counter	After replacing the X-ray tube assembly or in warranty cases
<b>S.07</b> 	Deleting the error memory	After replacing the X-ray tube assembly.
<b>S.09</b> 	Erasing EEPROM on DX1 (deletes all data)	In case of software problems (all software adjustments are deleted and must be reprogrammed).
<b>S.11</b> 	Adjusting the kV increase to customer's request	Too much kV increase in the spine region.
<b>S.13</b> 	Hardware service	Problems with DX1 board.
<b>S.14</b> 	Rotation functions	Mechanical malfunctions of rotation, and test of the light barriers.
<b>S.15</b> 	Check of actuators	Mechanical malfunctions, layer correction, light barrier adjustment.
<b>S.16</b> 	Check of film holder	Film holder problems.
<b>S.17</b> 	Unit identification	Changing the unit identification.
<b>S.18</b> 	Height adjustment	Checking freedom of movement, adjustment after replacing gas-operated spring, adjustment of Ceph movement, test of correction switch and of light barrier pulses.
<b>S.19</b> 	Forehead support motor	See S.15 and removal of forehead support.
<b>S.20</b> 	Jaw width	Adjusting DX1, functional test of potentiometer for forehead support.
<b>S.21</b> 	Diaphragm service	Adjusting DX1, fitting a diaphragm.
<b>S.24</b> 	Software update of EEPROM on DX1	Replacing the EEPROM J115 up to software version 04.50 / 05.52
<b>S.25</b> 	Check and adjustment of film-screen combination	Changing the film-screen combination.
<b>S.26</b> 	Check of automatic exposure system (AES)	Adjustment of DX8 for stability testing.
<b>S.30/31</b>	Diaphragm service, Pan/Ceph (omitted as of memory card V35.1 remote selection still possible only via SIDEXIS).	Diaphragm adjustment, selected by SIDEXIS.
<b>S.32</b> 	Image receptor test, Pan	For checking the image receptor.
<b>S.33</b> 	Image receptor test, Ceph	For checking the image receptor.
<b>S.34</b> 	Ceph arm service	Ceph arm problems.
<b>S.35</b> 	PC service	Problems with readiness for exposure.
<b>S.36</b> 	Acceptance testing, dose measurement	Dose measurement.
<b>S.37</b> 	XAB OP service	Read out and delete IP addresses
<b>S.88</b>	Demonstration mode	Selected with switch S1 on DX31. Switches the unit to demonstration mode (no radiation).

## 2.4 List of Error Messages for SIDEXIS

The following descriptions should always be seen in relation to the ORTHOPHOS Plus DS unit.

With error message E4 01, ORTHOPHOS Plus DS is generally functional and the SIDEXIS messages must be observed.

With other error messages on ORTHOPHOS Plus DS, the SIDEXIS messages indicate secondary faults.

OP: ORTHOPHOS Plus DS

XOP/XAB: Image acquisition card for Panorama X-rays

EDC: Image receptor electronics on ORTHOPHOS Plus DS

Error message up to SIDEXIS 5.2x	Error message from SIDEXIS 5.3	Description	Required action
<b>Multitimer Break 1</b>	<b>Multitimer Break 0xA001</b>	Interruption caused by releasing the X-ray button on the Multitimer during radiation.	
<b>Multitimer Break 2</b>	<b>Multitimer Break 0xA002</b>	Interruption caused by releasing the X-ray button on the Multitimer between two partial exposures.	
<b>OP Break 1</b>	<b>OP Break 0xB001</b>	Interruption by OP.	Check error message on Multitimer.
<b>OP Break 2</b>	<b>OP Break 0xB002</b>	Interruption by OP.	Check error message on Multitimer.
<b>EDC Break XXX</b>	<b>EDC Break 0xCxxx</b>	Voltage problem/failure at image receptor, see Appendix A.	The displayed number XXX is an indication of several error numbers, see Appendix A.
<b>XOP Break 1/2/3 **</b>	<b>XAB OP Break 0xD001/002/003 **</b>	Timeout on the XOP/XAB, no defined functional call from OP within a preset time. (only for ORTHOPHOS Plus DS Ceph)	Check for mechanical obstruction of the OP movement. Check the software version of OP and SIDEXIS for compatibility.
<b>XOP Break 10 **</b>	<b>XAB OP Break 0xD010 **</b>	Incorrect communication between XOP/XAB and image receptor.	Remove the image receptor from its holder and reinsert it firmly. Check signal path with XOP: XOP – cable connection – OP – image receptor. Check signal path with XAB: XAB – image receptor. Check the voltages at the image receptor.
<b>XOP Break 30</b>	<b>XAB OP Break 0xD030</b>	OP pulses are more than intended for the exposure.	Check the software versions of OP and SIDEXIS for compatibility. Check whether OP is "hung up".
<b>XOP Break 40</b>	<b>XAB OP Break 0xD040</b>	Image acquisition card holds insufficient storage space for the intended exposure.	Check the software versions of OP and SIDEXIS for compatibility. Check the memory configuration of XOP/XAB.
<b>XOP Break 50 **</b>	<b>XAB OP Break 0xD050 **</b>	Image acquisition card receives no image information.	Remove EDC from its holder and reinsert it firmly. Check the signal path: Check signal path with XOP: XOP – cable connection – OP – image receptor. Check signal path with XAB: XAB – image receptor. Check the voltages at the image receptor.
<b>XOP Break 60/70</b>	<b>XAB OP Break 0xD060/070</b>	ORTHOPHOS emits incorrect exposure ID.	Check the software versions of OP and SIDEXIS for compatibility. Check the error message displayed by the OP. (data or address bus error?)

\*\* see Correcting error of message E4 08 and E4 01

The error message indicates a combination of several fault causes:  
e.g. display on SIDEXIS 3 : C

HEX			3		C			
Valence	8 2 <sup>3</sup>	4 2 <sup>2</sup>	2 2 <sup>1</sup>	1 2 <sup>0</sup>	8 2 <sup>3</sup>	4 2 <sup>2</sup>	2 2 <sup>1</sup>	1 2 <sup>0</sup>
Bit	7	6	5	4	3	2	1	0
Error			EDC RESET	EDC VSP	EDC VSN	EDC VDD	EDC VAN	EDC VAP
	0	0	1	1	1	1	0	0

These voltages are not present

Bit = 0    Ok, fault has not occurred

Bit = 1    Error, fault has occurred, signal is missing

Bit number	Error	LED RHB		Meaning
0	EDC VAP ERROR	V212	0x01	Voltage VAP +18 V not present/too low
1	EDC VAN ERROR	V232	0x02	Voltage VAN – 18 V not present/too low
2	EDC VDD ERROR	-----	0x04	Voltage VDD not present/too low
3	EDC VSN ERROR	V122	0x08	Voltage VSN – 5 V not present/too low
4	EDC VSP ERROR	V112	0x10	Voltage VSP +5 V not present/too low
5	EDC RESET ERROR	V222	0x20	Voltage VCC +5 V not present/too low or digital section is in reset state
6			0x40	Internal message
7			0x80	Internal message



## 3 Troubleshooting

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# Troubleshooting

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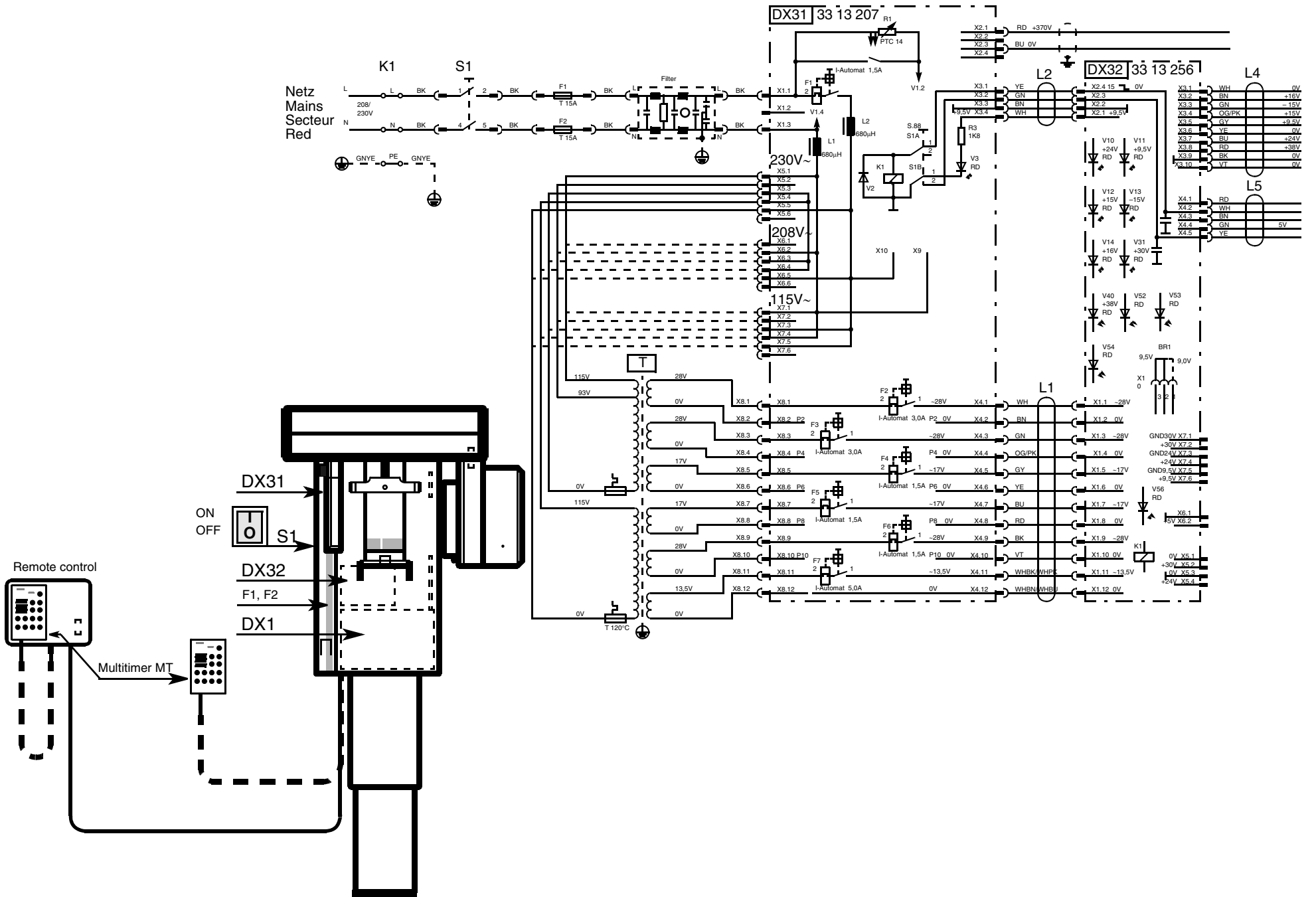
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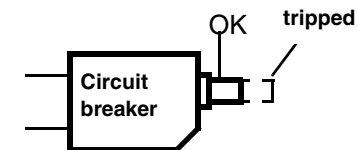
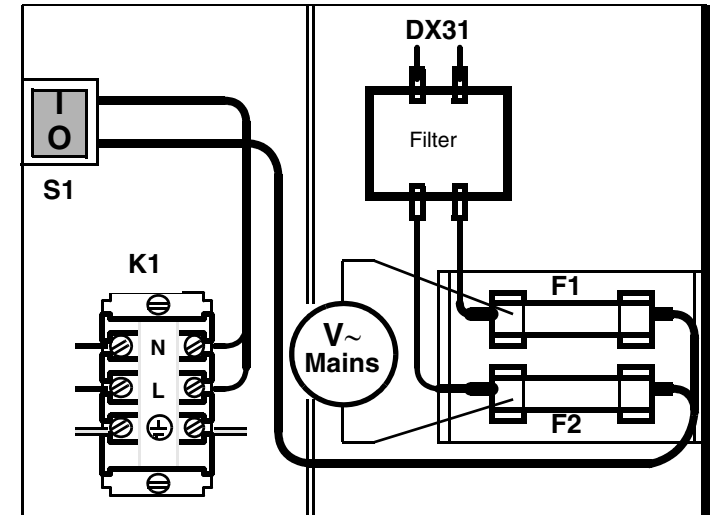
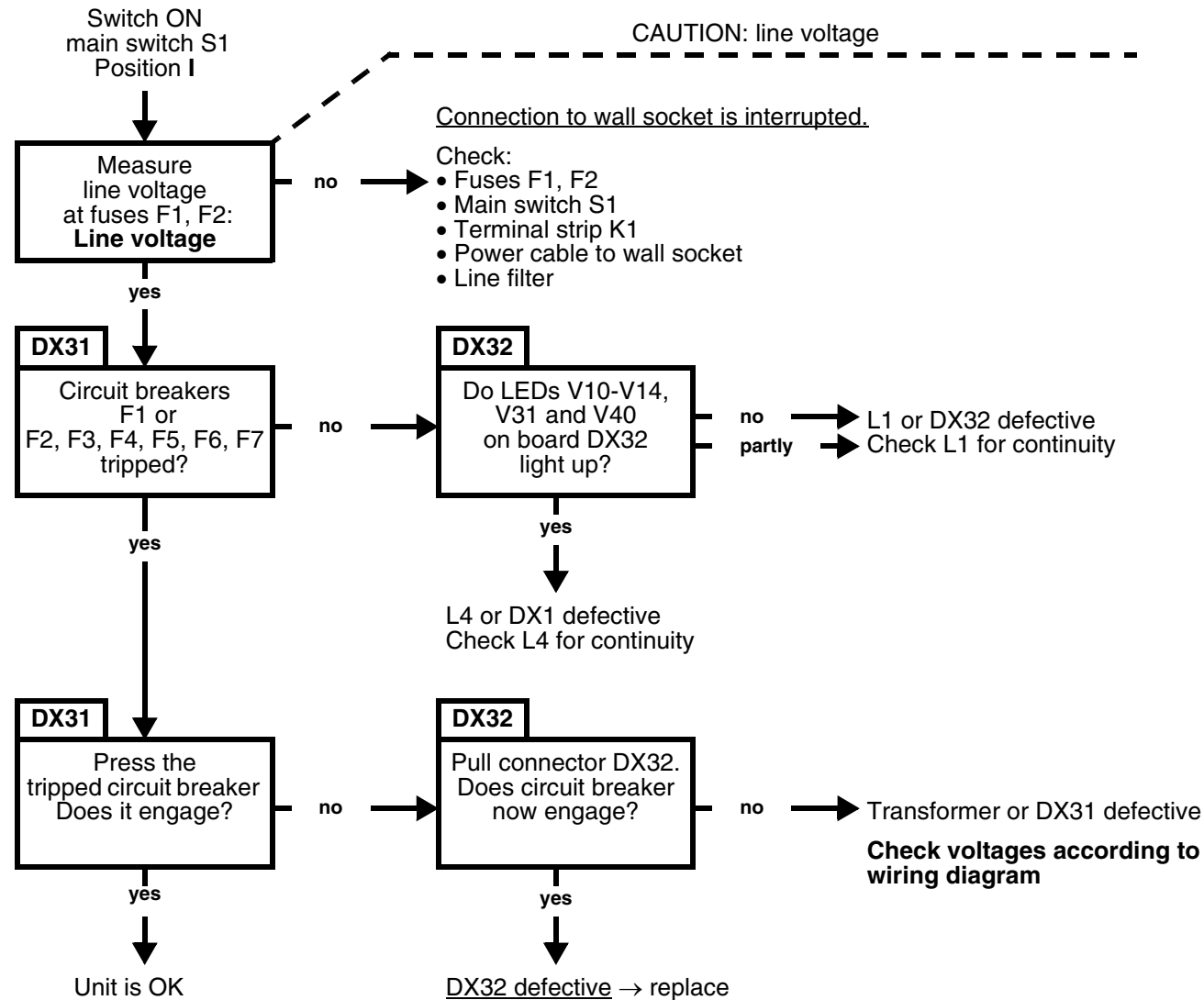




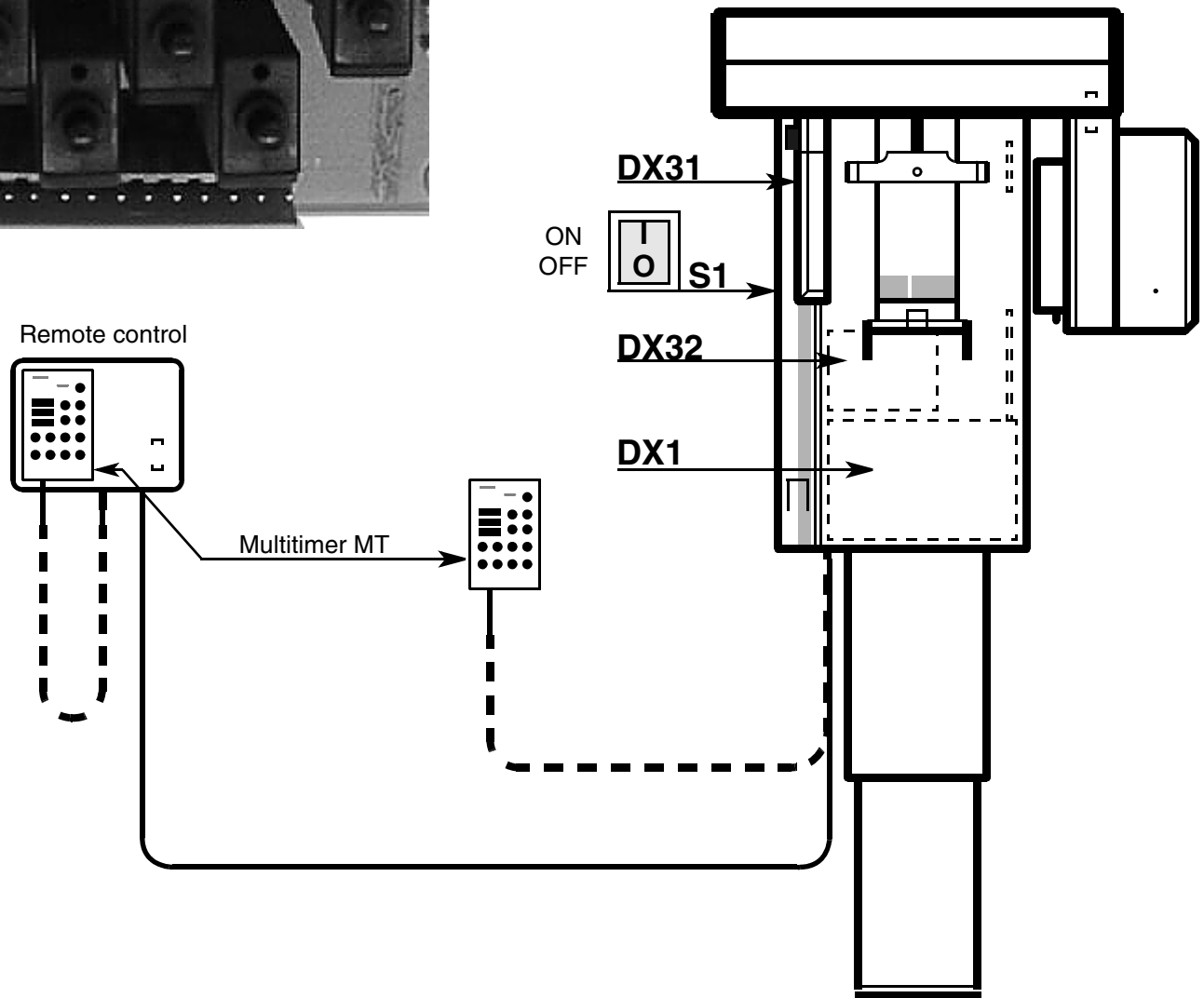
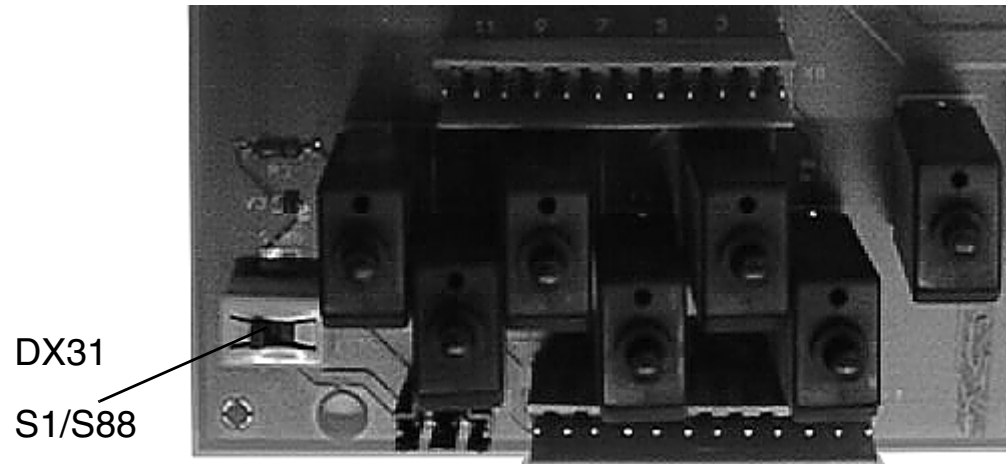
**CAUTION: Always switch the unit OFF before connecting a measuring instrument or replacing any components!**

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D 3297.077.01.10.02 04.2007

- Is the line voltage present at the wall socket?
- Are the mains fuses F1 and F2 in order? If not: always replace both fuses.



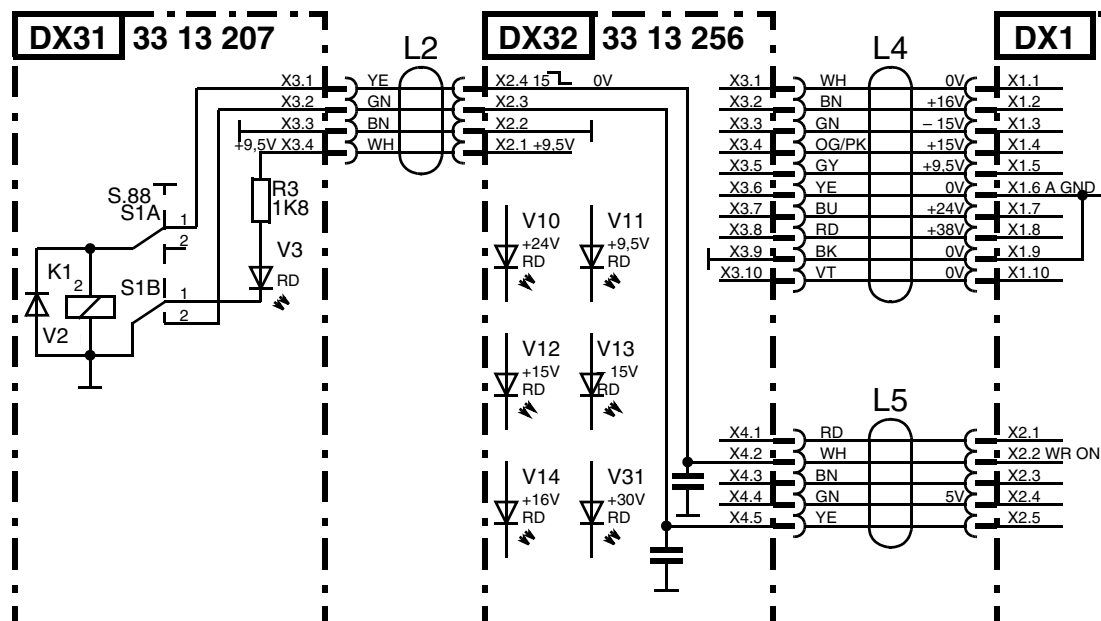
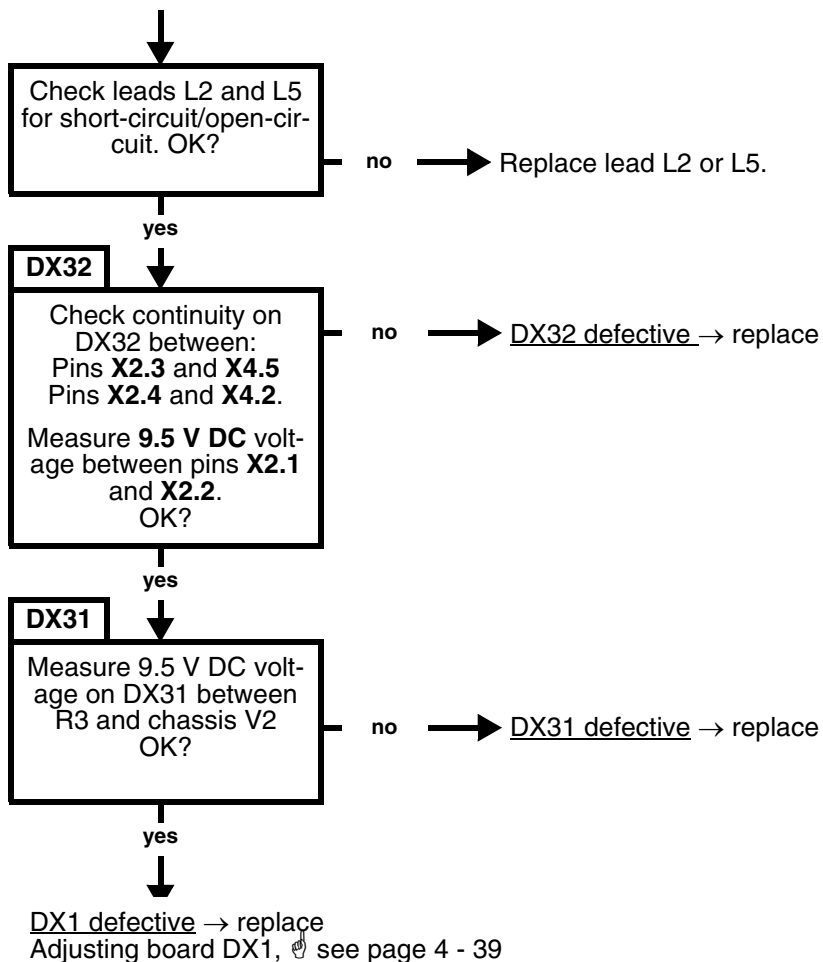
### 3.1 Unit cannot be switched on



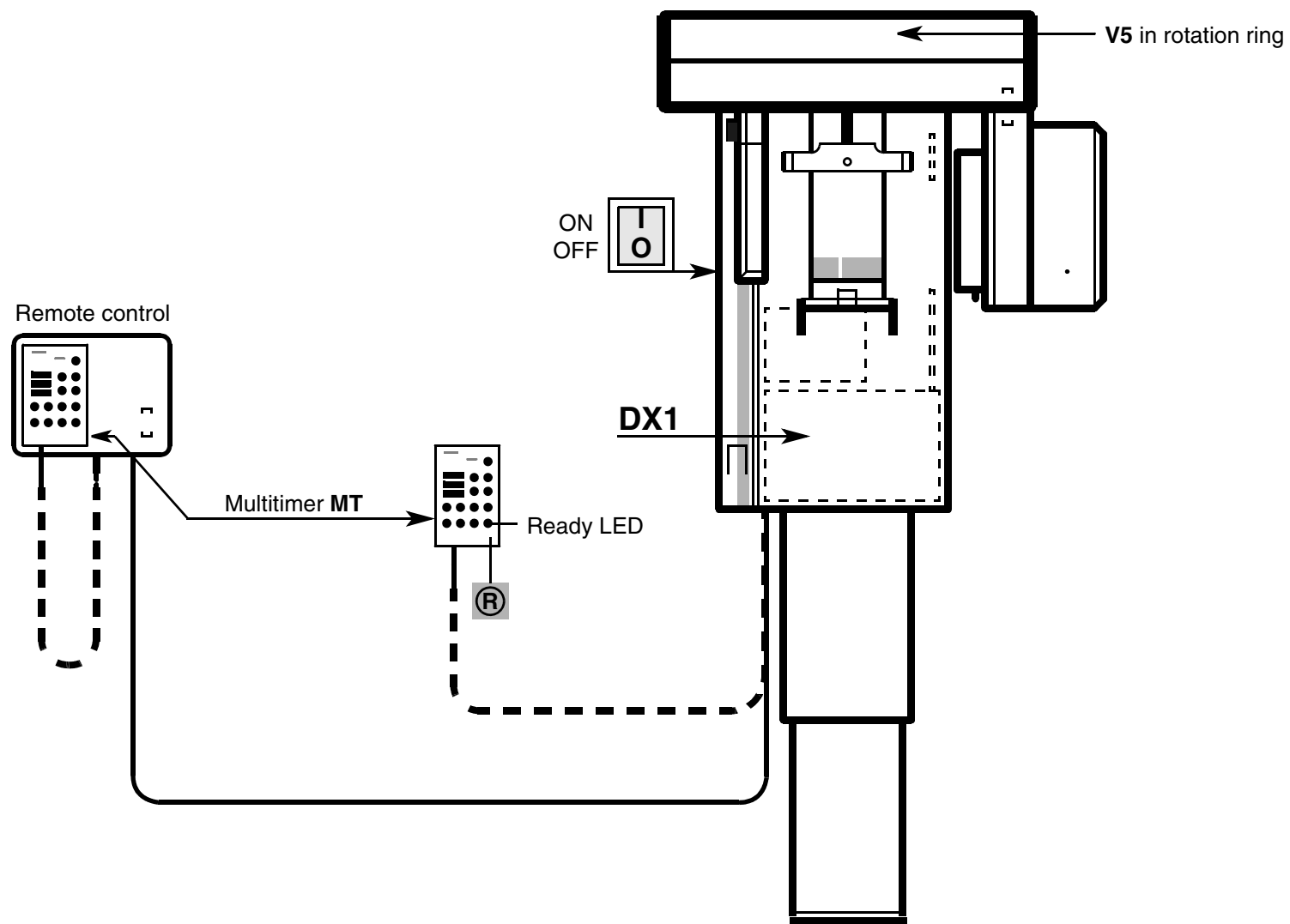
- Check the position of the sliding switch S1 on board DX31.

After turning the unit on and completion of the self-adjustment process, S.88 must be visible on the program display for about 4 sec with the switch on the Multitimer in position 2. The same applies when switching over from position 1 to position 2.

The demonstration mode cannot be switched ON/OFF.



### 3.2 Demonstration mode cannot be turned ON/OFF



**CAUTION: Always switch the unit OFF before connecting a measuring instrument or replacing any components!**

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D 3297.077.01.10.02 04.2007

**Correcting error of help message H3 01.** Rotation unit is not in the start position.

- **Press the Return key R!** The rotation unit travels to the start position.  
The Ready LED above the R key on the Multitimer continues flashing.

**Possible faults**

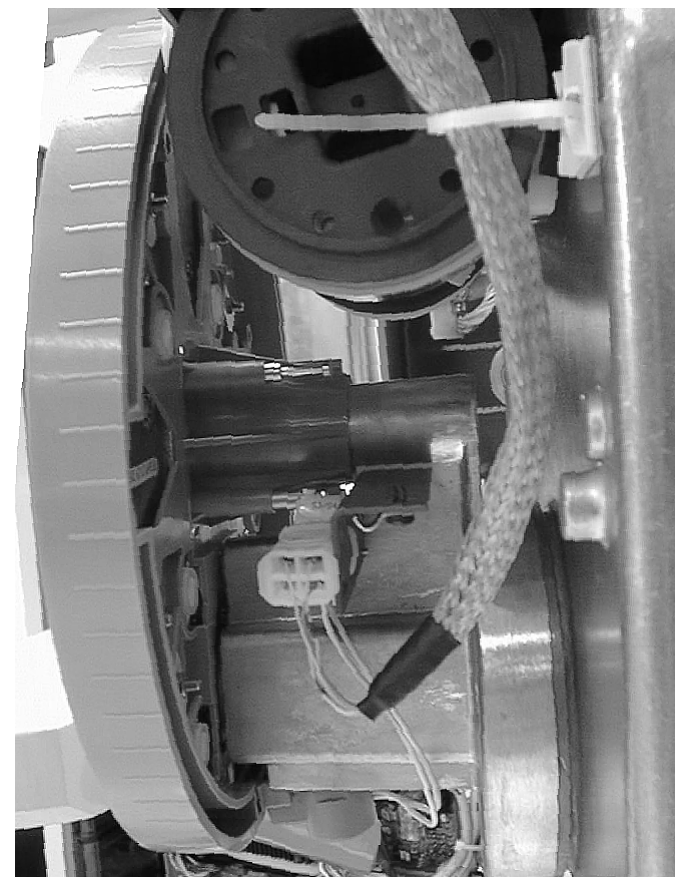
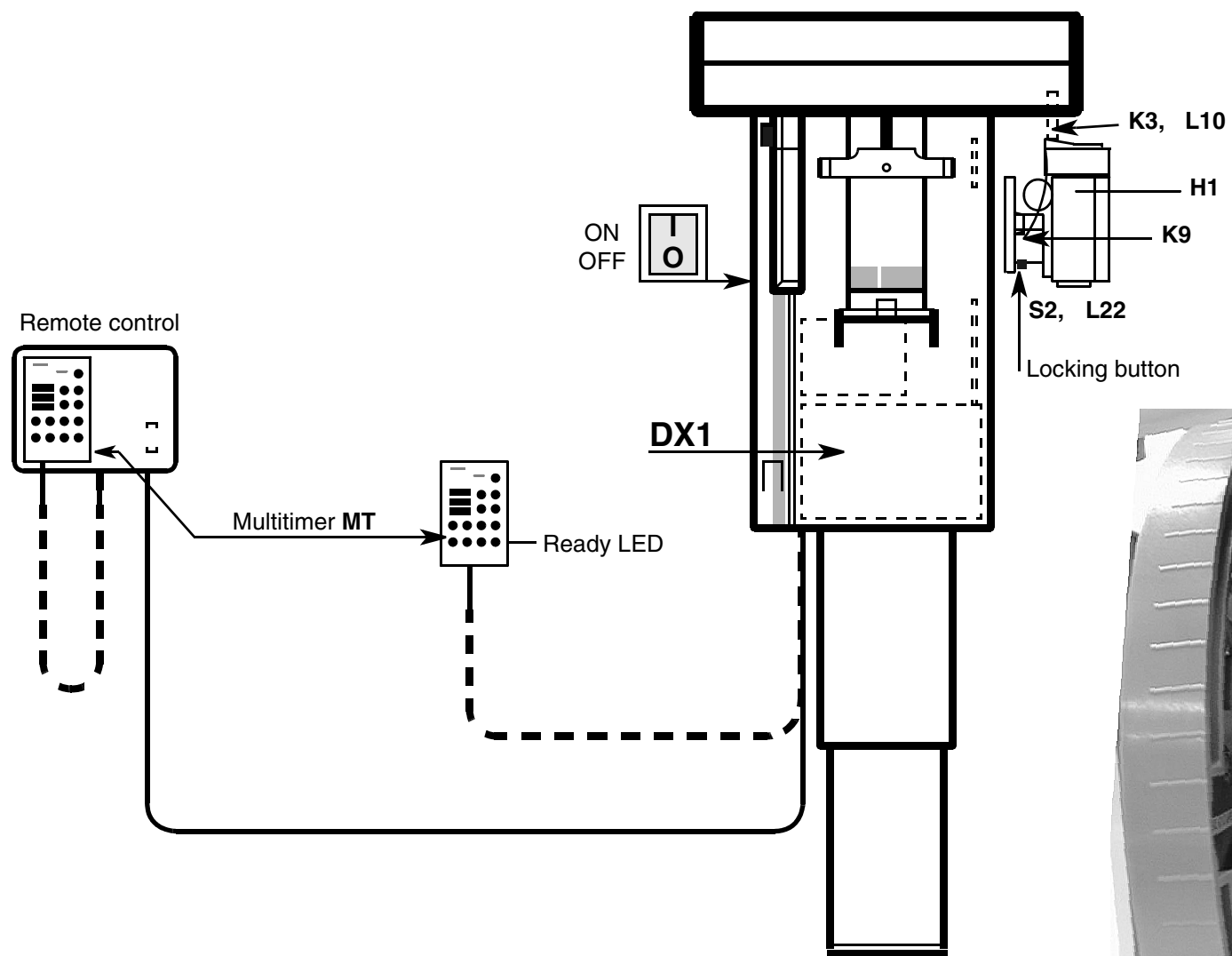
Check with service  
**routine S.14**

An **error message** is displayed:  see page 2 - 4.

The light barrier **V5** is defective or maladjusted, or  
cable L15 to DX5 is interrupted.

Test / replace / repair.

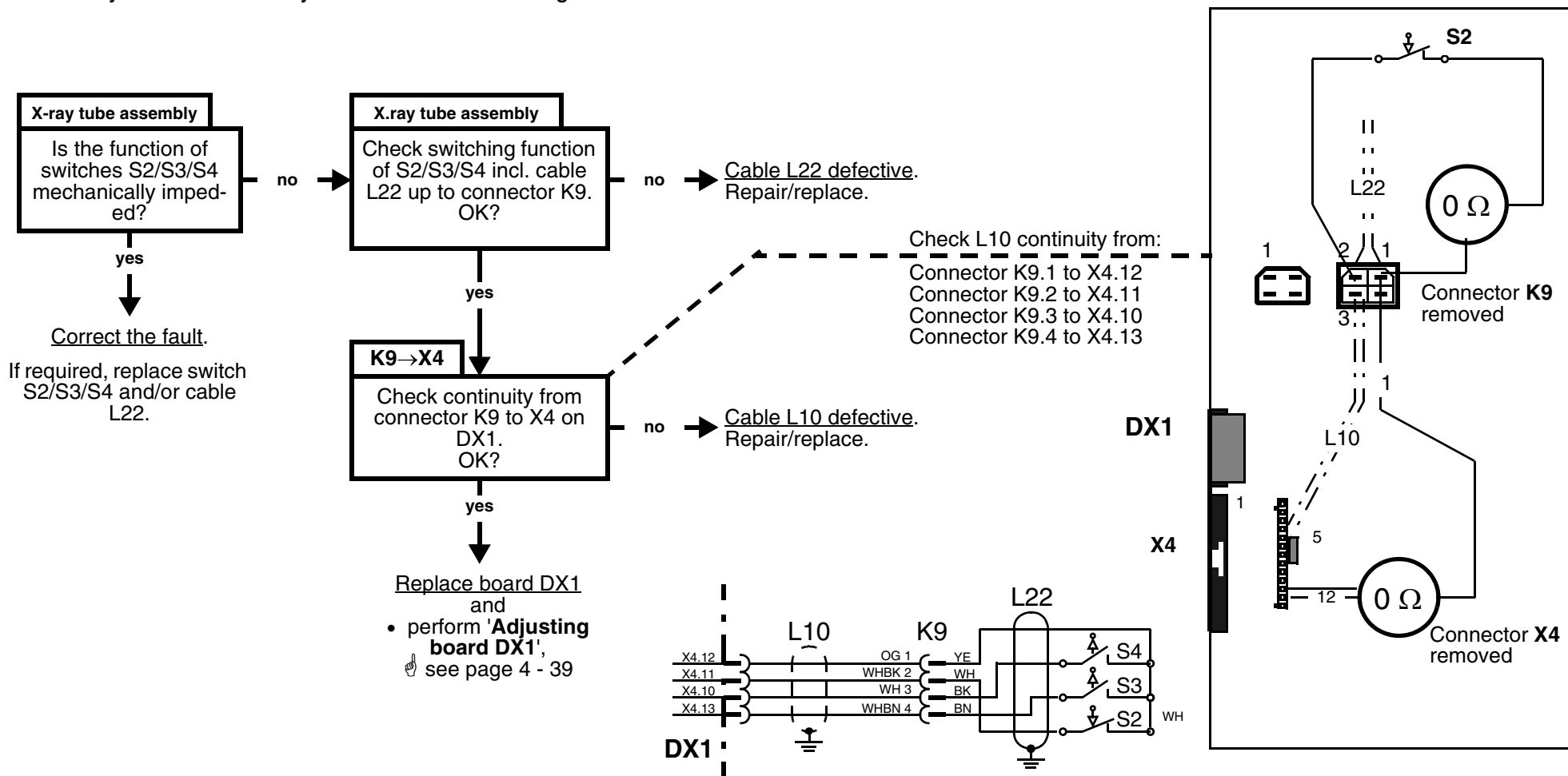
### 3.3 Correcting error of help message H3 01.



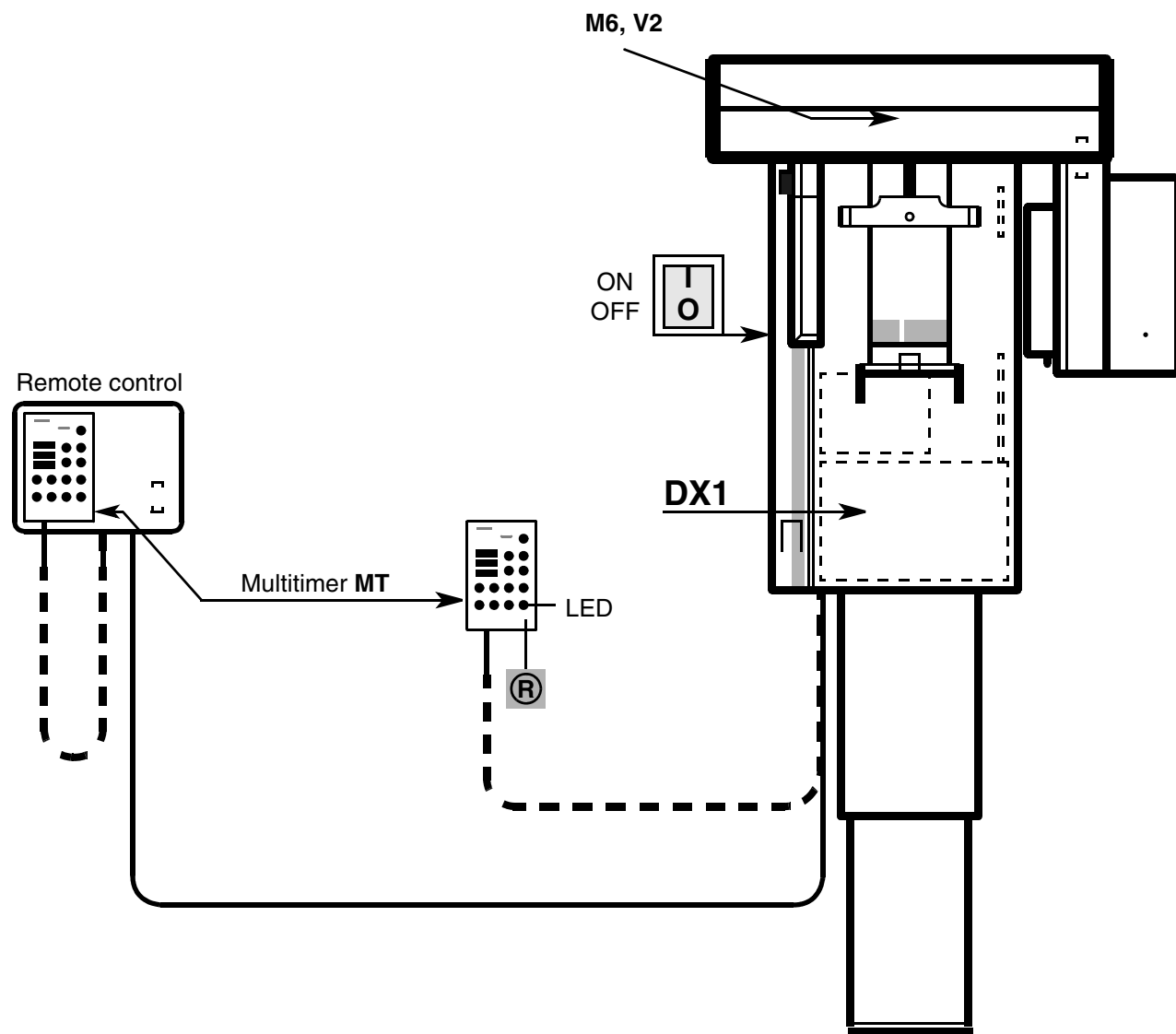


**Correcting errors of help messages H3 05 and H3 06.** No Panorama diaphragm is set on the diaphragm wheel. The locking button on the diaphragm wheel is not engaged. Correct the error with service routine S.21, test step 03.

- Are the diaphragms programmed?
- Is connector K9 correctly inserted at the X-ray tube assembly?
- Has the locking button correctly engaged on the the diaphragm wheel? Set a Panorama diaphragm. The Ready LED above the R key on the Multitimer is flashing.



### 3.4 Correcting errors of help messages H3 05 and H3 06.



**CAUTION: Always switch the unit OFF before connecting a measuring instrument or replacing any components!**

54 53 571 D 3297  
D 3297.077.01.10.02 04.2007

**Correcting error of help message H3 07.** The forehead support is in an incorrect position for the selected program.

- Drive the forehead support to a position permissible for the selected program.  
The LED above the R key on the Multitimer continues flashing.

**Possible faults**

Check with service  
routine **S.19**

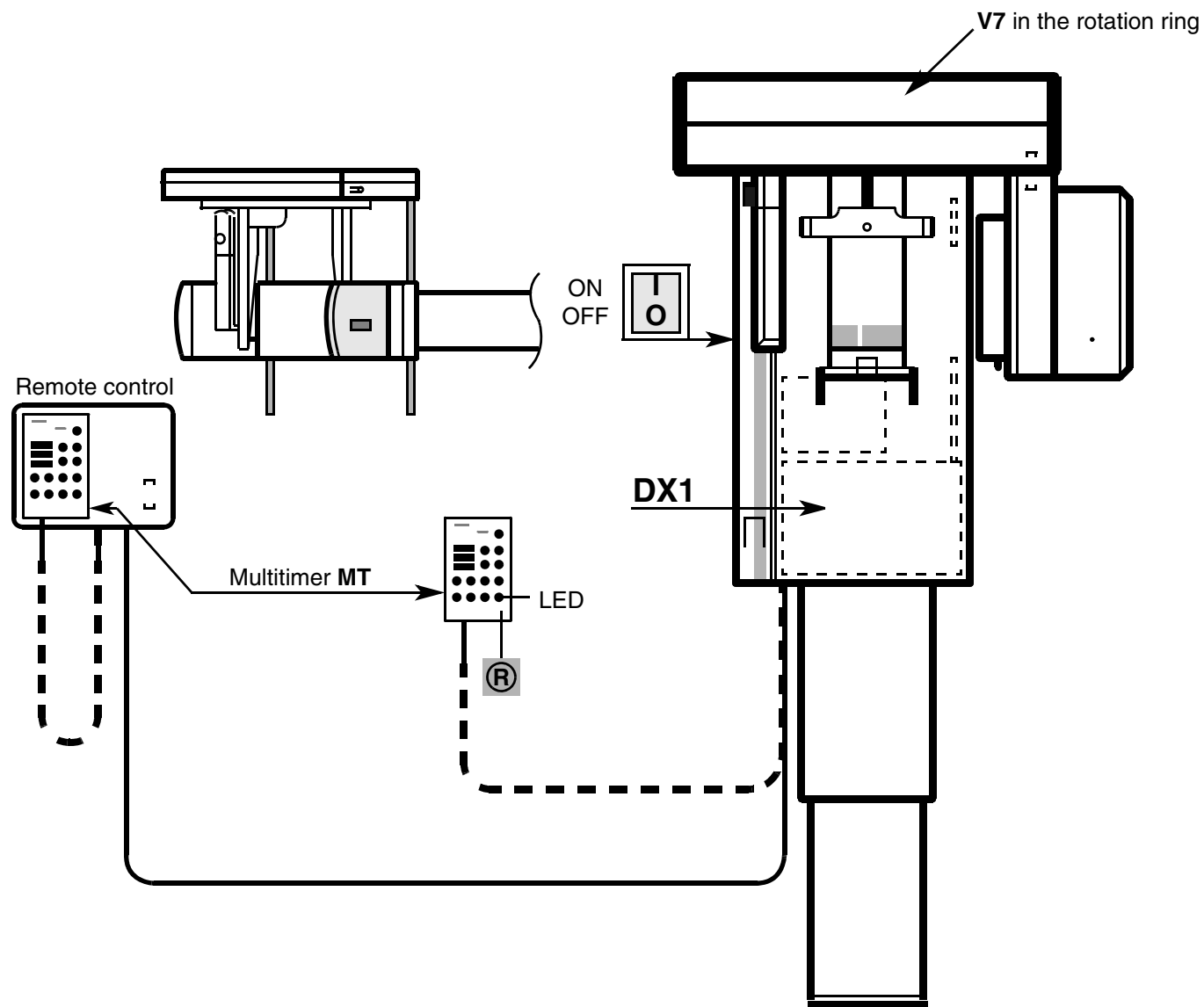
An **error message** is displayed:  see page 2 - 4.

The light barrier **V2** is defective or maladjusted, or the lead L15 to DX5 is interrupted or a cable is trapped in the light barrier.

Test / replace / repair.

Motor M6 is defective or cable L13 to DX5 is interrupted.  
Test / replace / repair.

### 3.5 Correcting error of help message H3 07.



**CAUTION: Always switch the unit OFF before connecting a measuring instrument or replacing any components!**

54 53 571 D 3297  
D 3297.077.01.10.02 04.2007

**Correcting error of help message H3 12.** The rotation unit is not in the start position for a Ceph exposure.

- **Press the Return key R!** The rotation unit travels to the start position for cephalometry.  
The LED above the R key on the Multitimer continues flashing.

**Correct the fault with service routine S.14, test steps 02 and 04**

See section "**Service routine S.14**"

Test step 02:

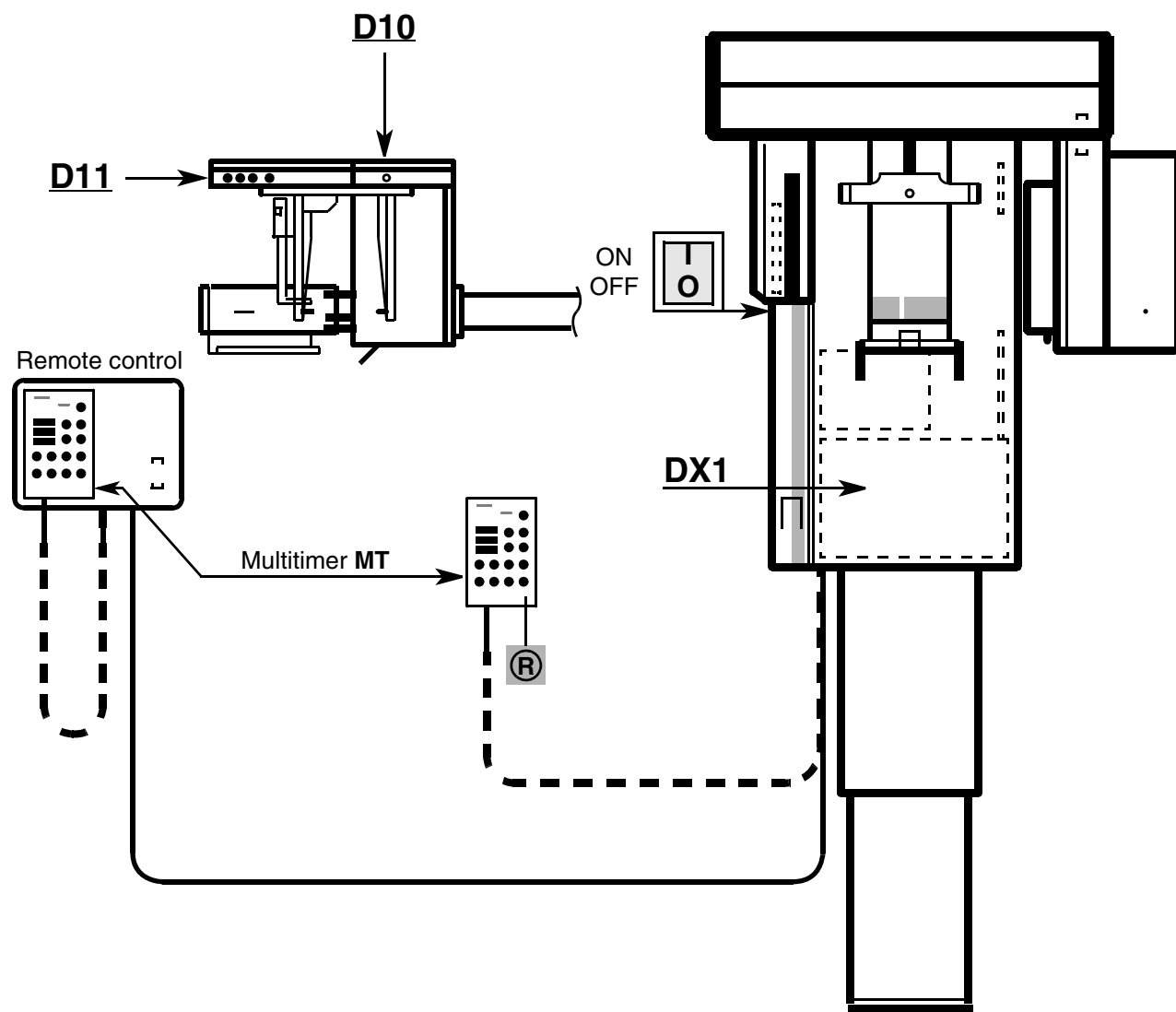
If an error message is displayed  
see list of error messages ☞ see page 2 - 4.

Test step 04:

If the LEDs do not light up as specified in test step 04 for the  
Ceph position: light barrier **V7** is defective  
or the cable is interrupted.

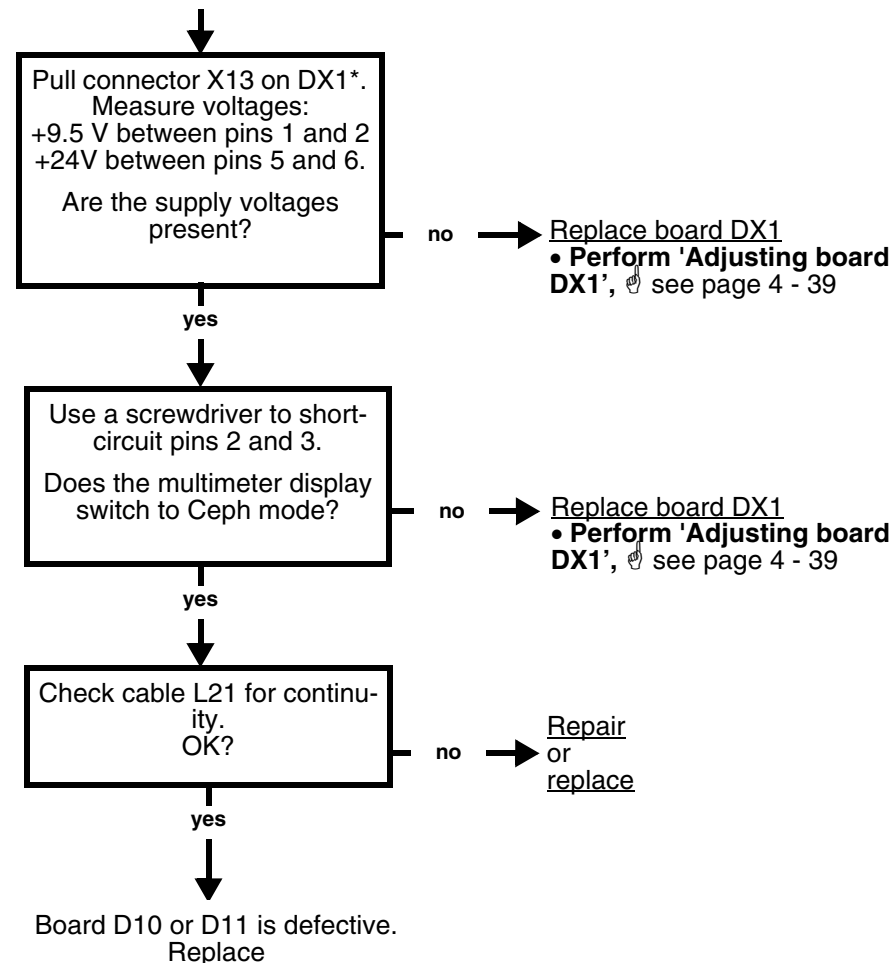
Test / repair / replace.

### 3.6 Correcting error of help message H3 12.

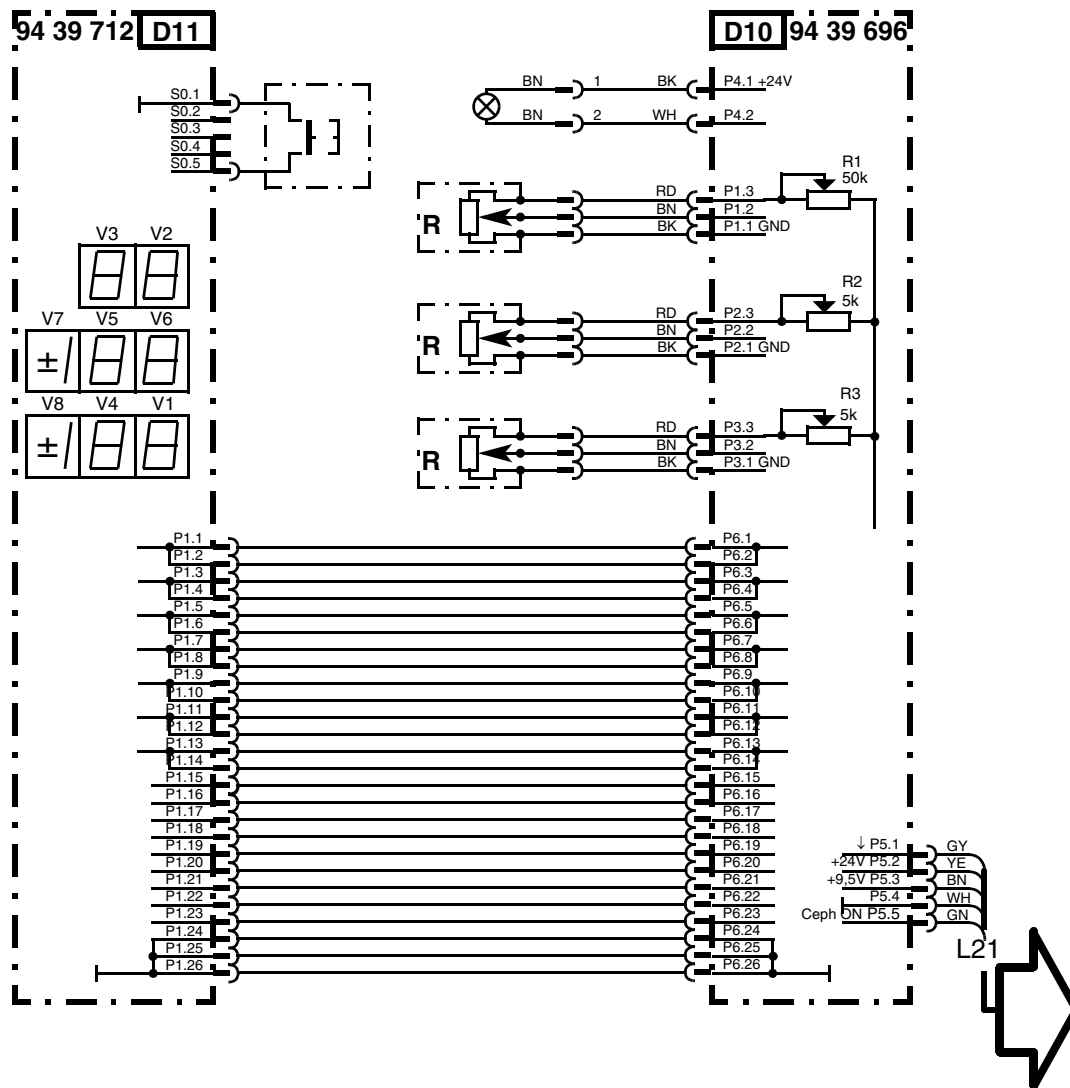


**Correcting error of help message H3 16.** The Ceph function is not selected.

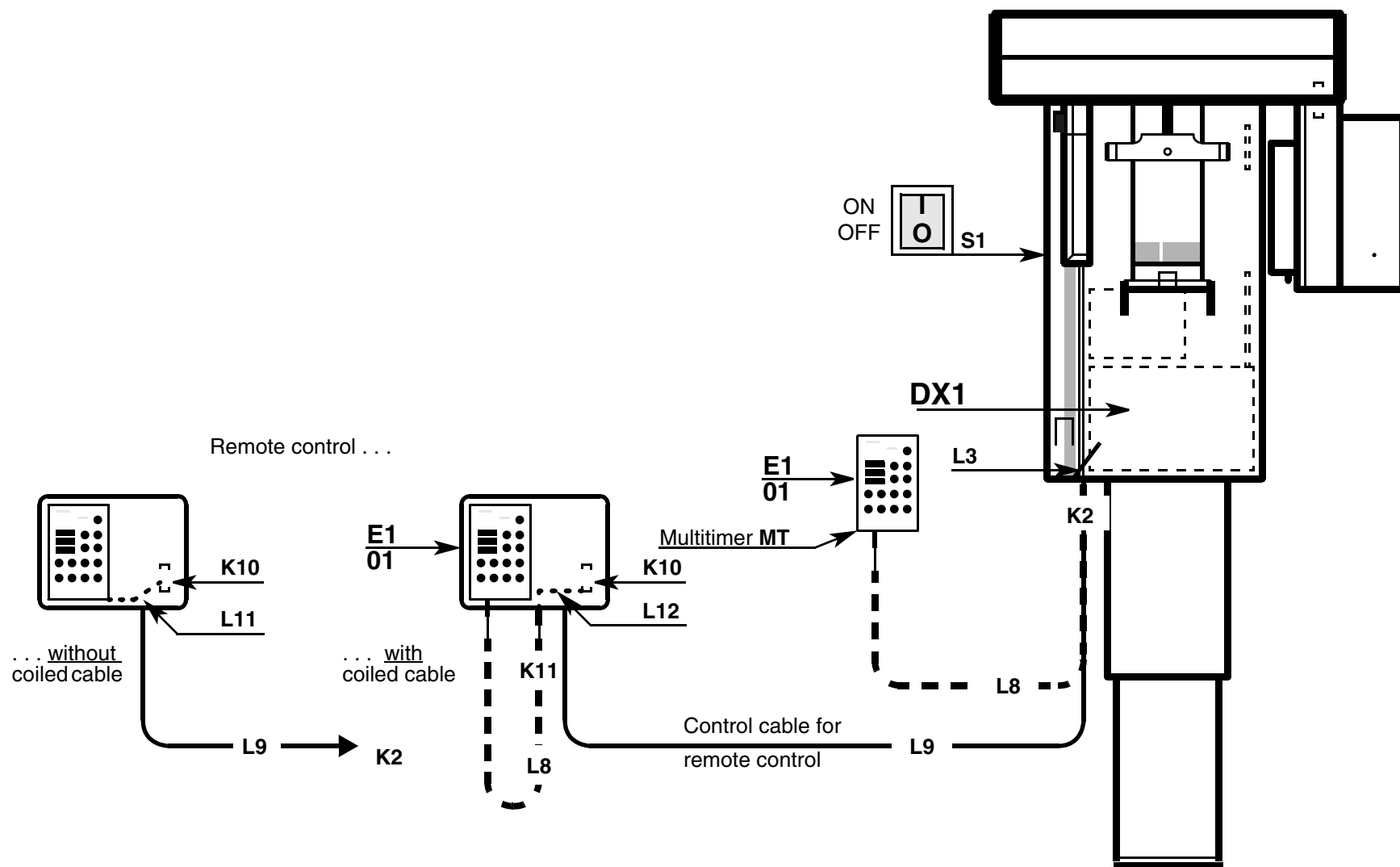
- Press the C key on the Cephalometer! Does the LED above the R key on the multimeter continue flashing?



\* After the test reconnect the plug to the correct socket.

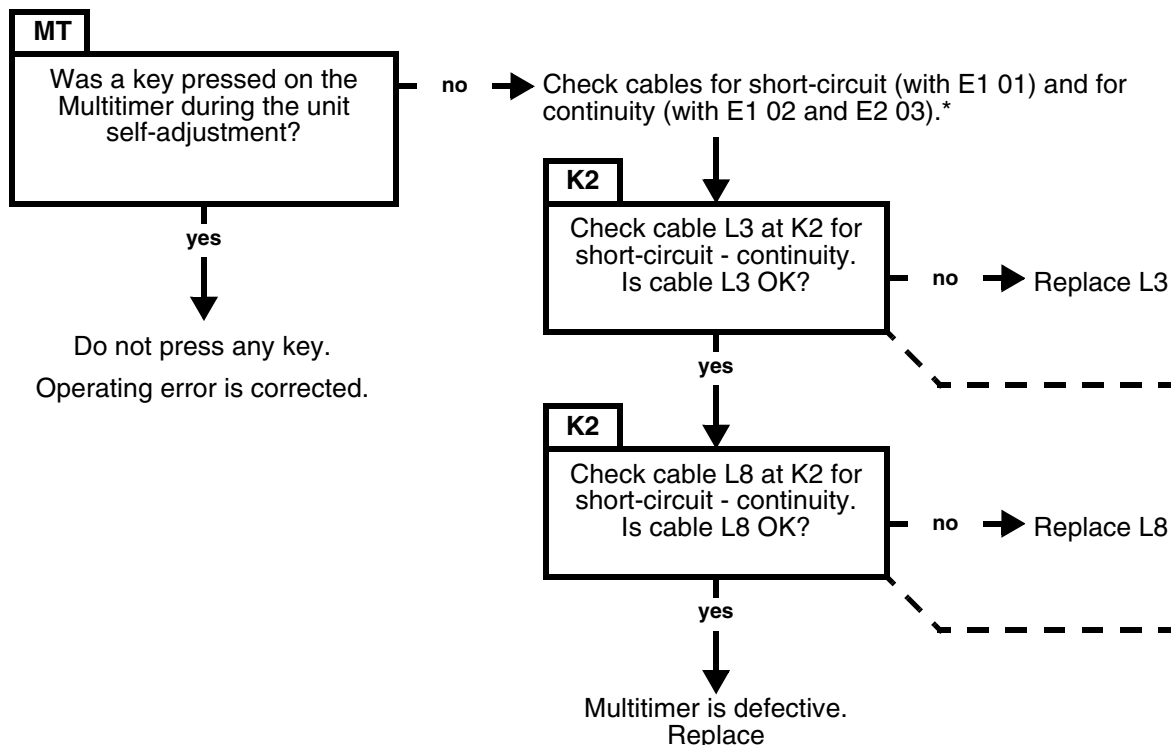


### 3.7 Correcting error of help message H3 16.



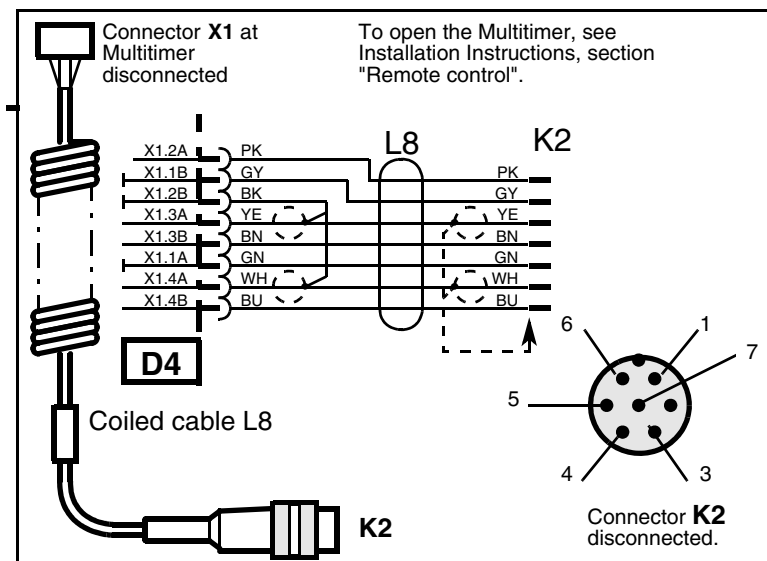
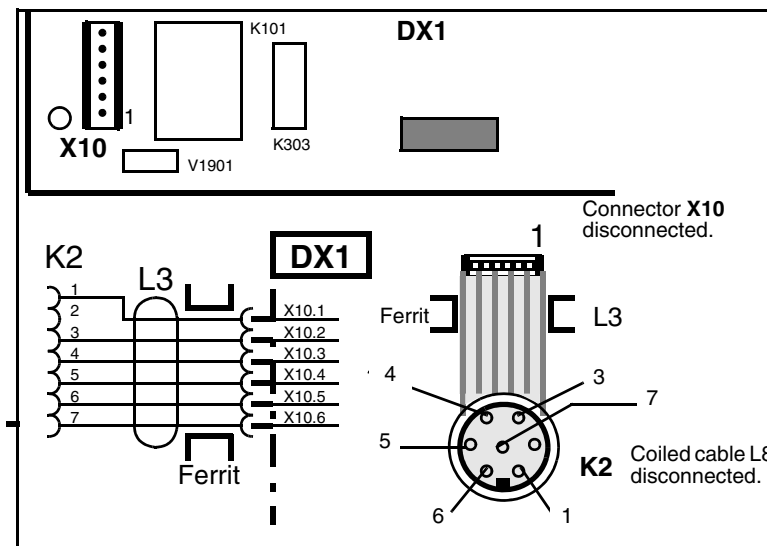


- After power ON, the unit performs a self-adjustment routine.  
No key must be pressed on the Multitimer during the self-adjustment!

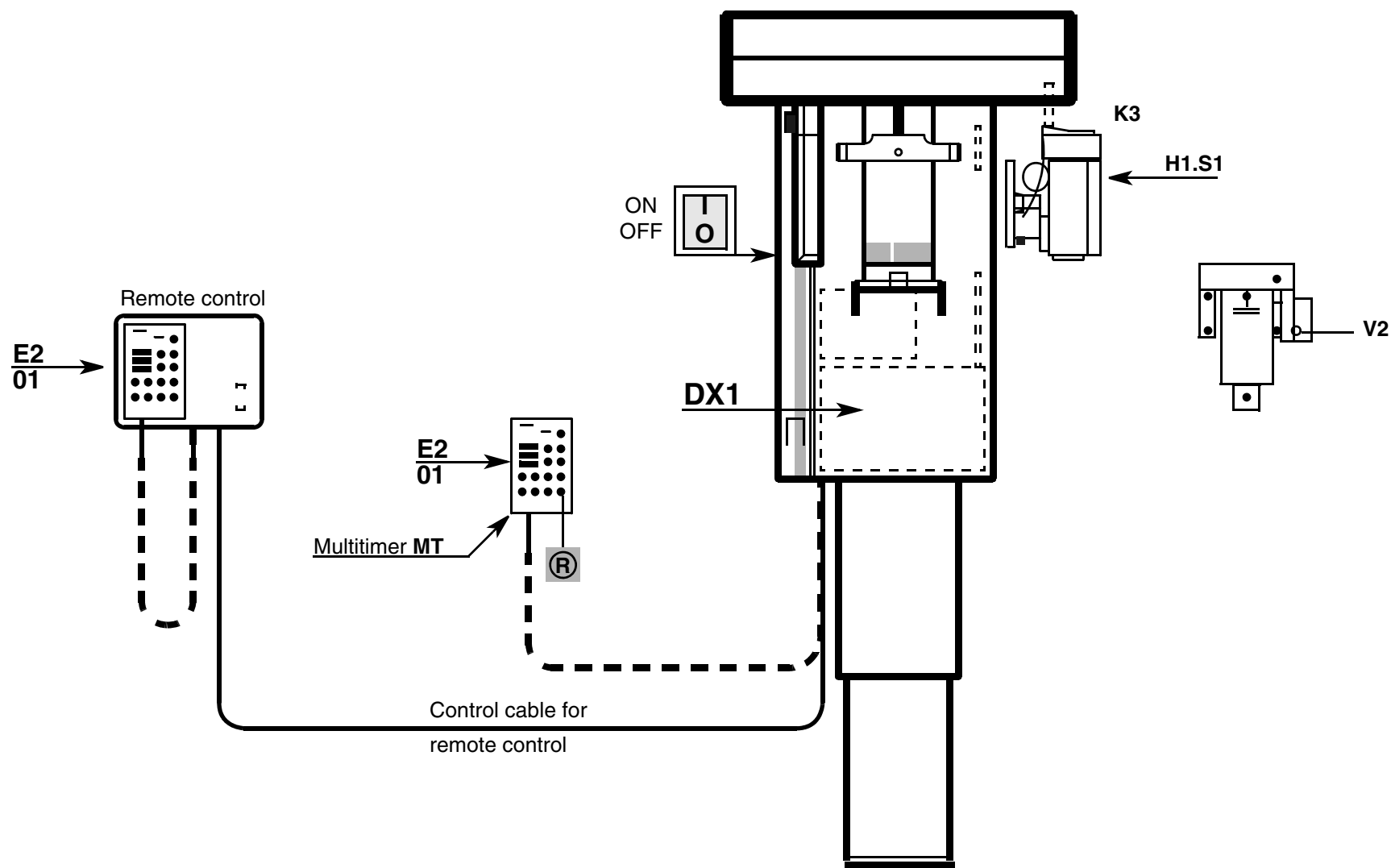


\* If a remote control is provided:  
Connect the Multitimer to the unit (connector K2 below the shielding plate).  
If the error no longer occurs, check the cable L9 for short-circuit. With remote control without coiled cable, also check cable L11.

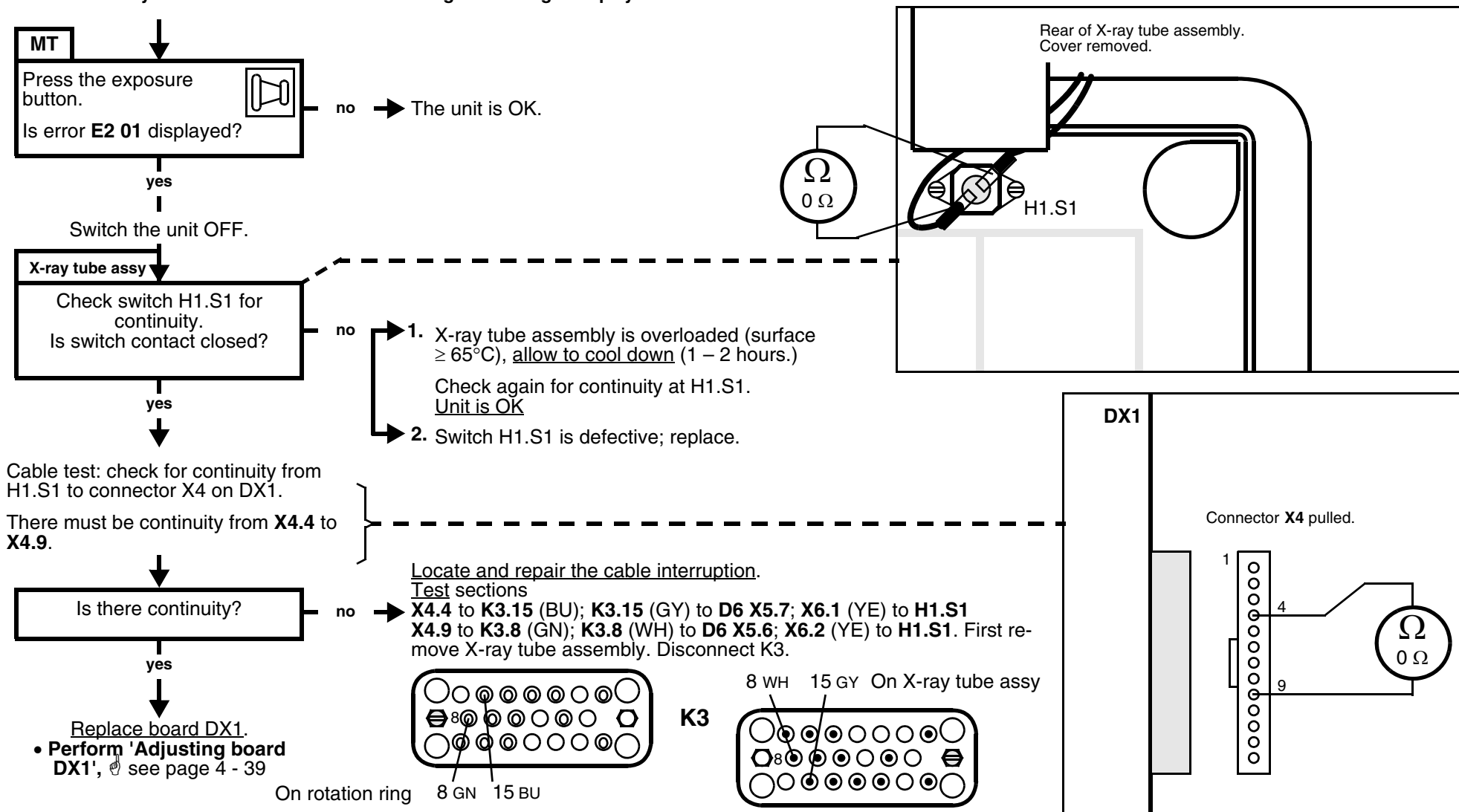
- If the error persists:  
Replace board DX1  
• Perform 'Adjusting board DX1', see page 4 - 39



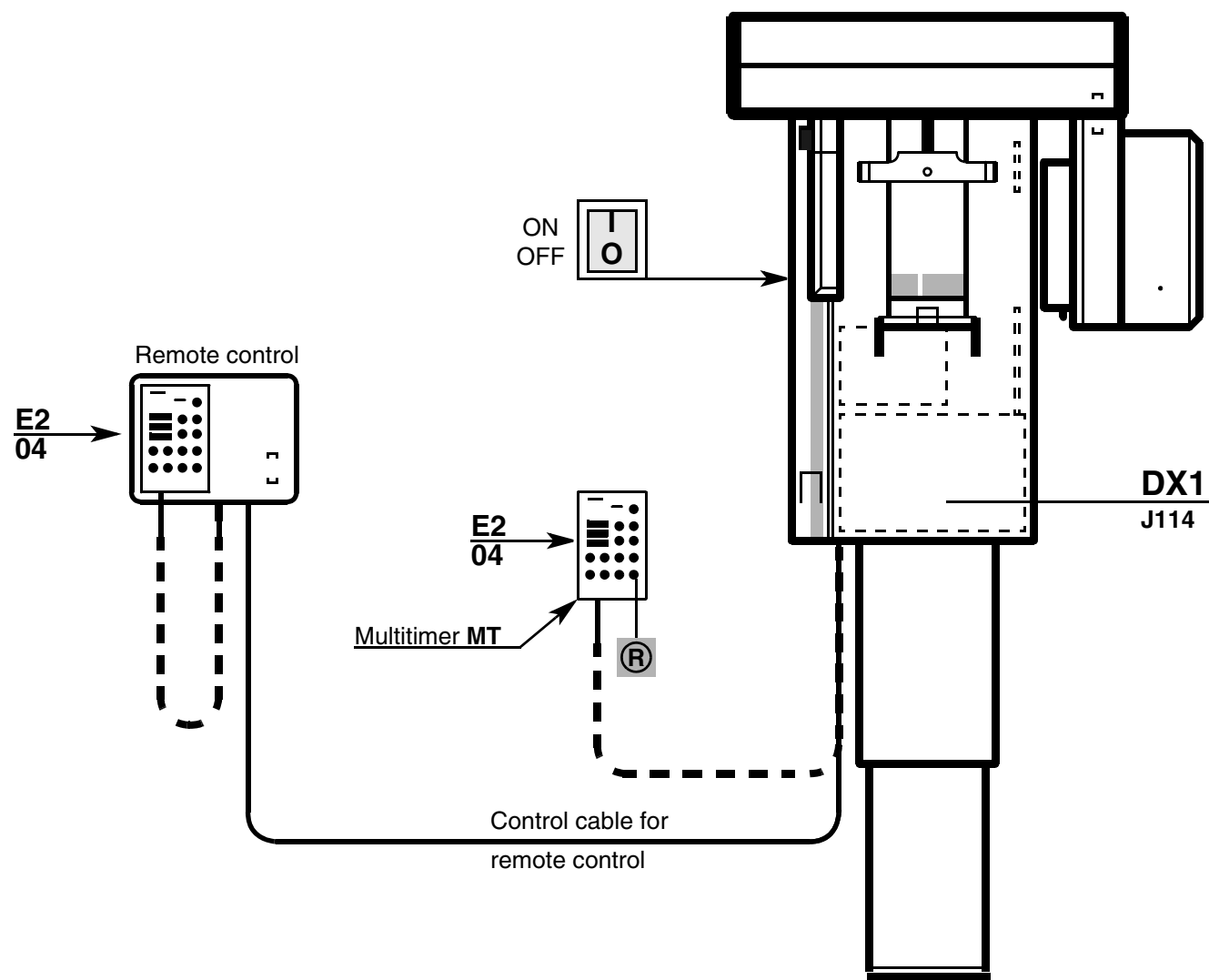
### 3.8 Correcting error of messages E1 01, E1 02, E2 03: Signal paths to control board DX1 are interrupted.



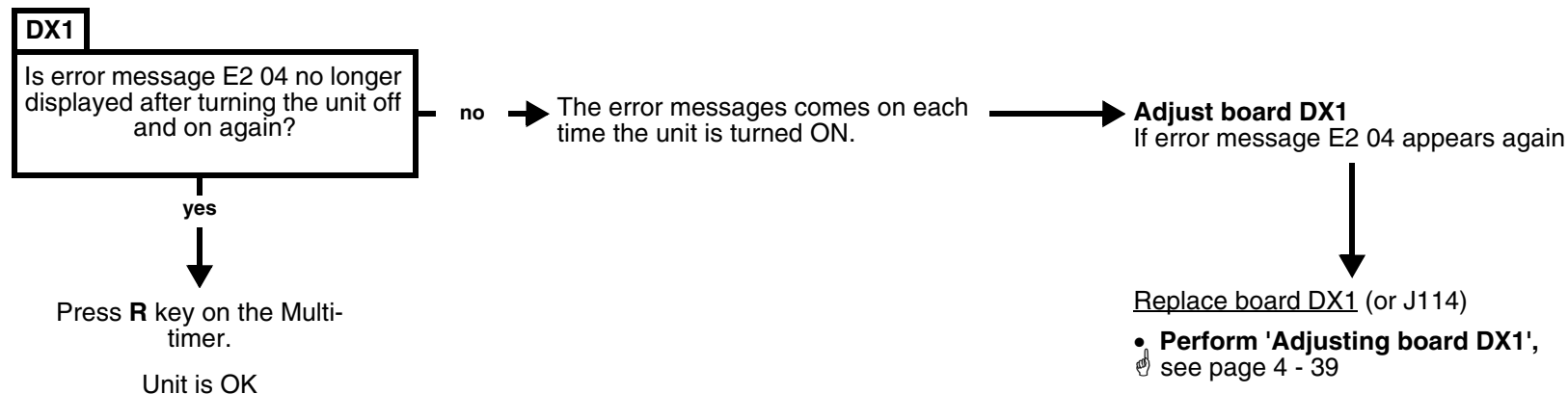
- Look for the Orthophos symbol on the LED display.
- Thermo switch H1.S1 has responded. Wait for it to close again (contact open, check connector K3). Press the R key on the Multitimer. The error message is no longer displayed.



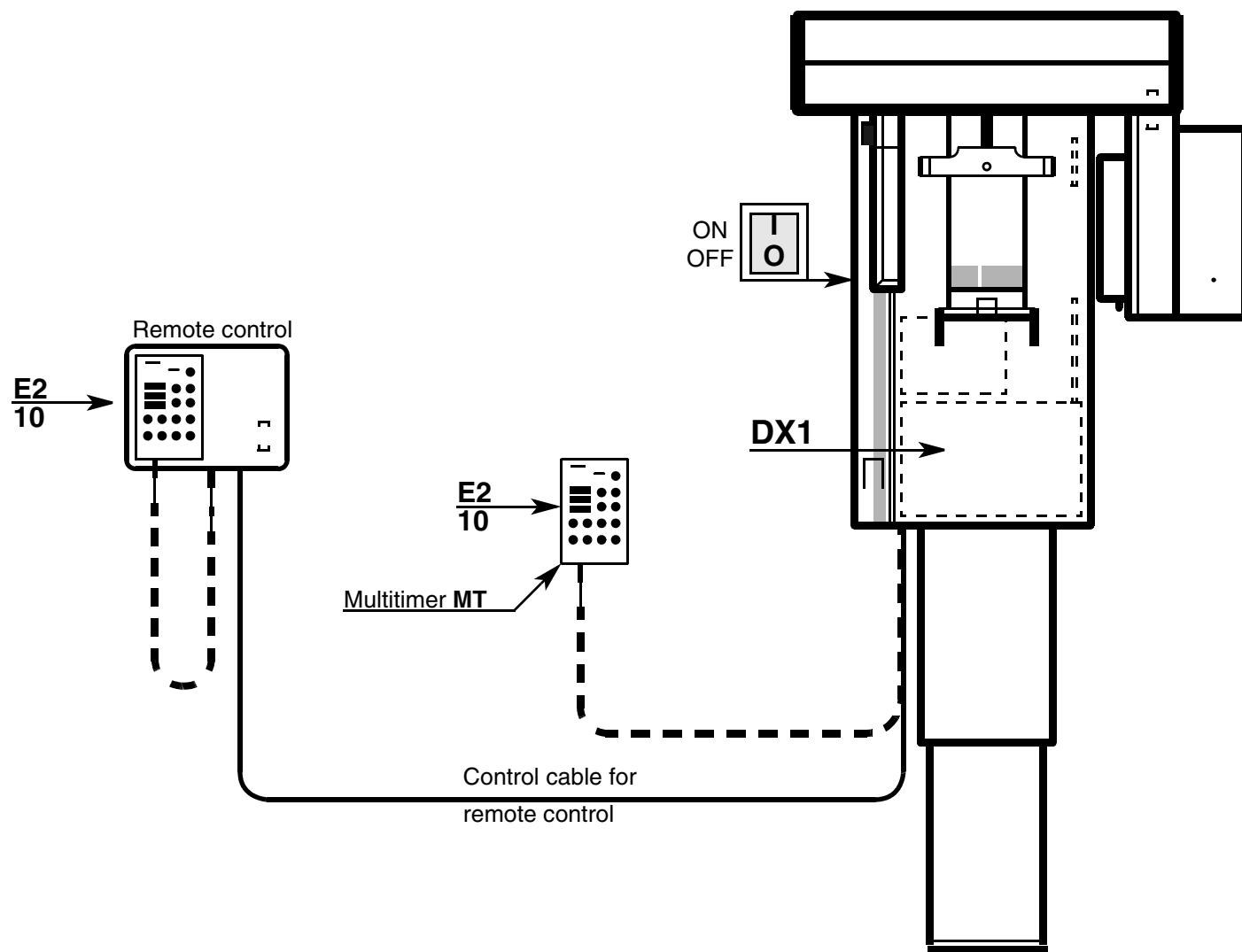
### 3.9 Correcting error of message E2 01: X-ray tube assembly overheated.



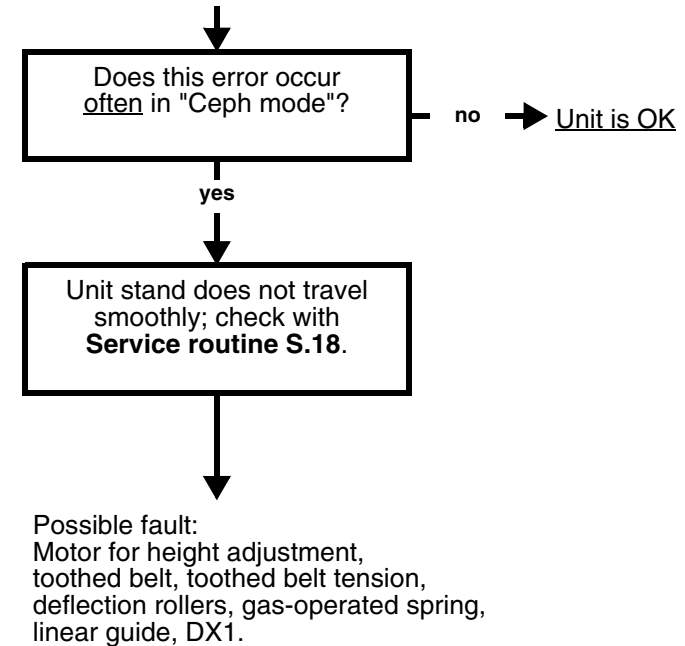
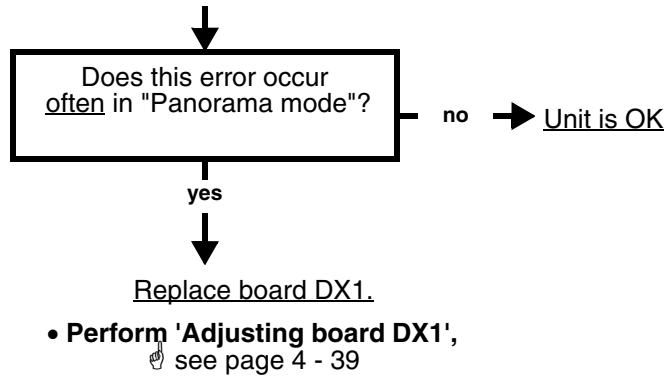
- Zero power range of EEPROM J114 is invalid or destroyed.



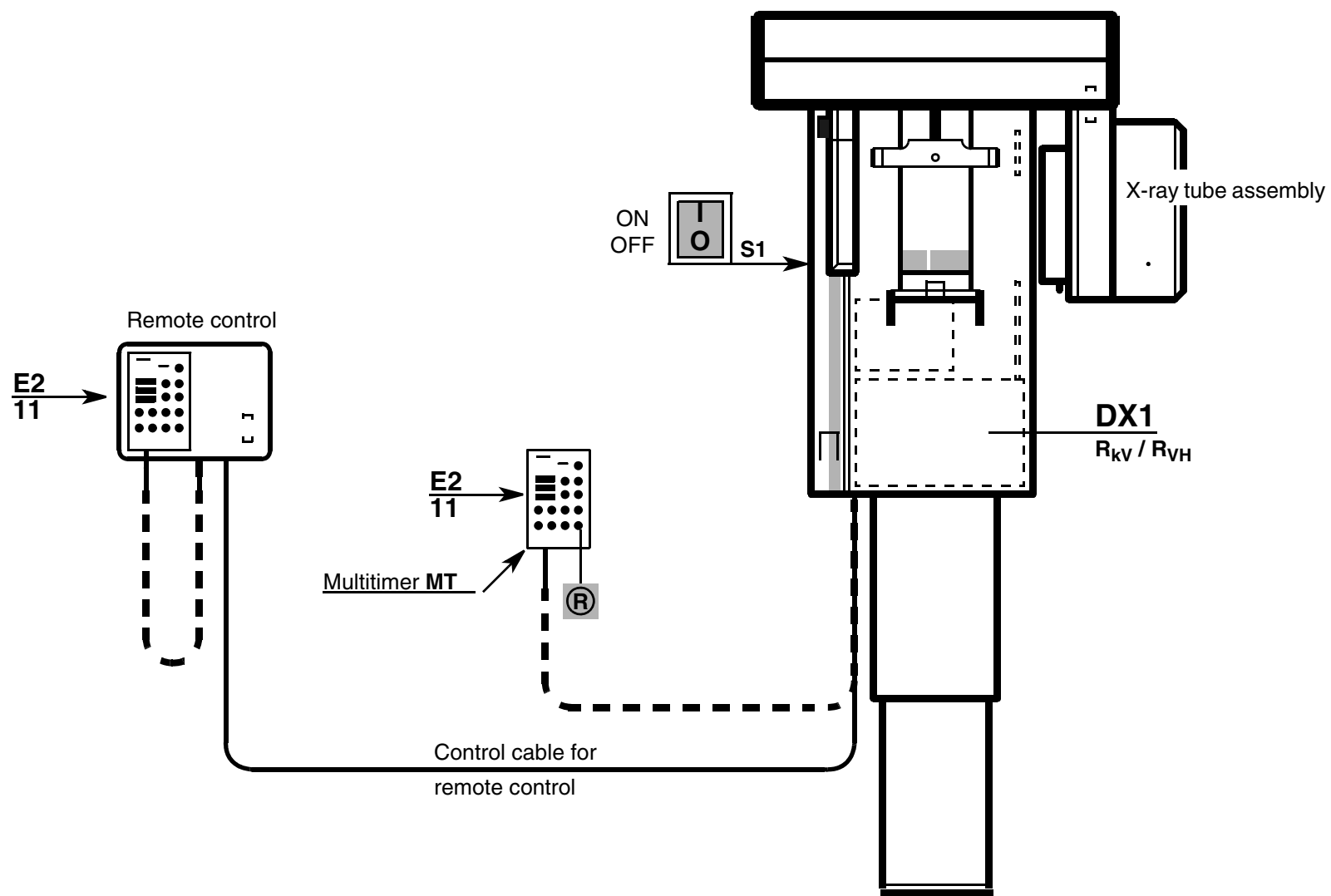
### 3.10 Correcting error of message E2 04: Zero power range has been re-initialized.



- In the service mode, acknowledge with the R key.
- Maximum radiation time of the program has been exceeded.



### 3.11 Correcting error of message E2 10: Max. radiation time of the program is exceeded.





- $KV_{max}$  has been exceeded.  
Select highest kV value.

**MT / DX1**

Check kV setpoint with  
'Service routine S.03,'  
test step 01.

If outside tolerance:  
Perform Point 1. or 2.

Release an exposure.  
Does the error message  
repeat?

no → The unit is OK again.  
Perform Service routine S.05,  
test step 02.

Preheating VH is too low.  
Automatic adjustment with  
'Service routine S.05.2'

Release an exposure.  
Does the error message  
repeat?

no → The unit is OK again.

**DX1**

Replace • Perform 'Adjusting  
board DX1', see page 4 - 39

Release an exposure.  
Does the error message  
repeat?

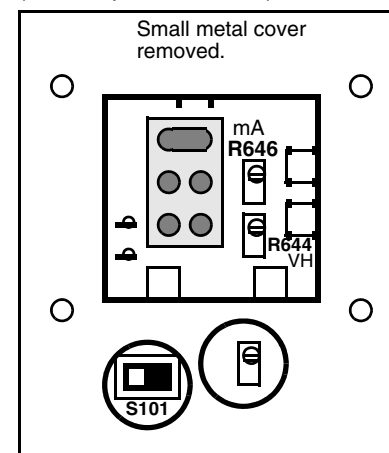
no → The unit is OK again.

Replace the X-ray tube assembly

- 'X-ray tube assembly' – action to be taken . . . , see page 4 - 39

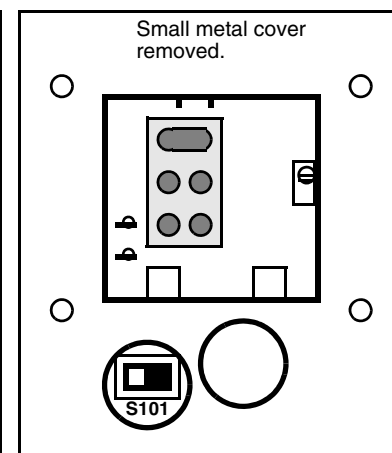
**DX1 33 13 108**

1. With Service routine S.03.4  
only delete Offset and enter set-  
point values with potentiometer  
(test steps 02 and 03).

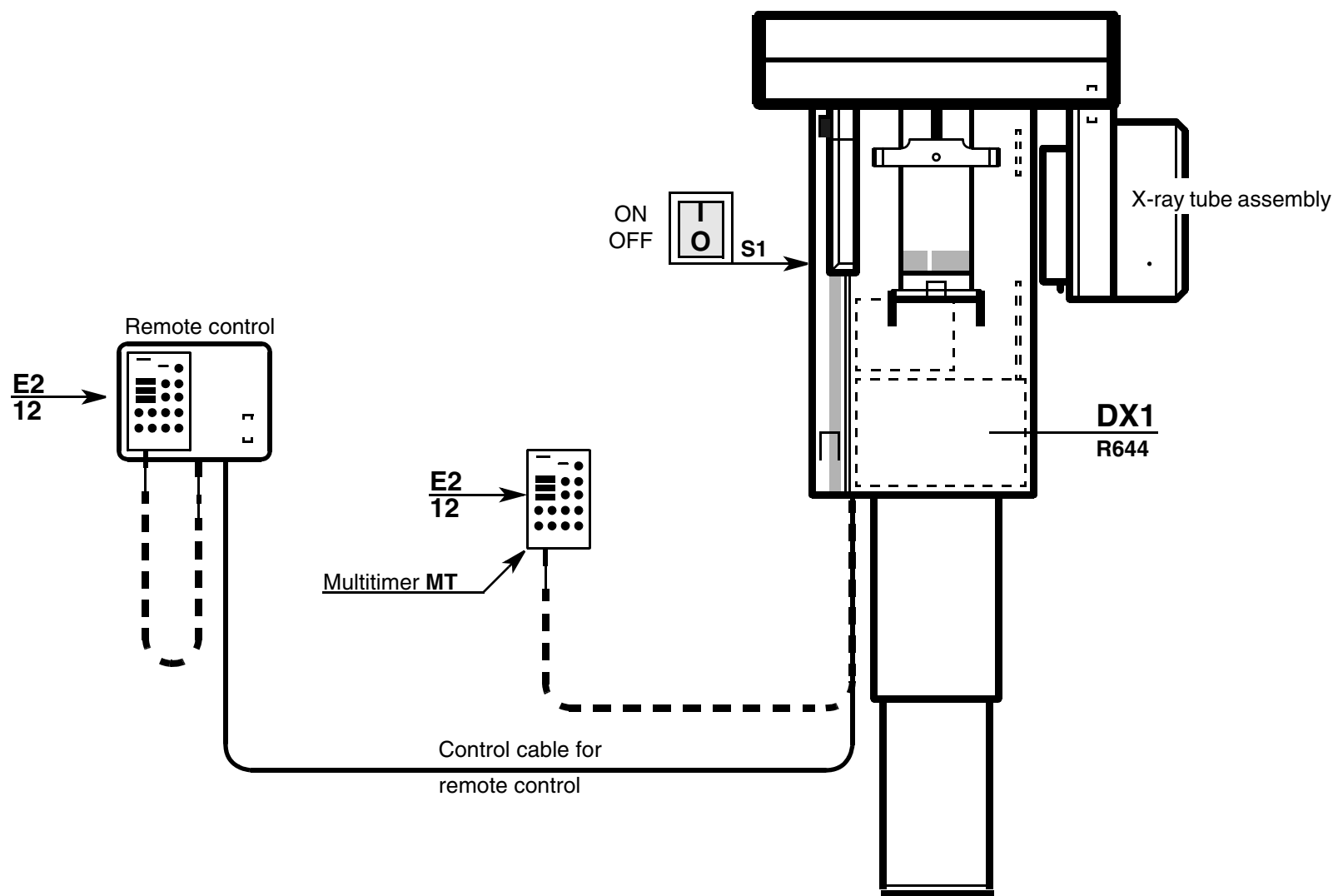


**DX1 51 67 080**

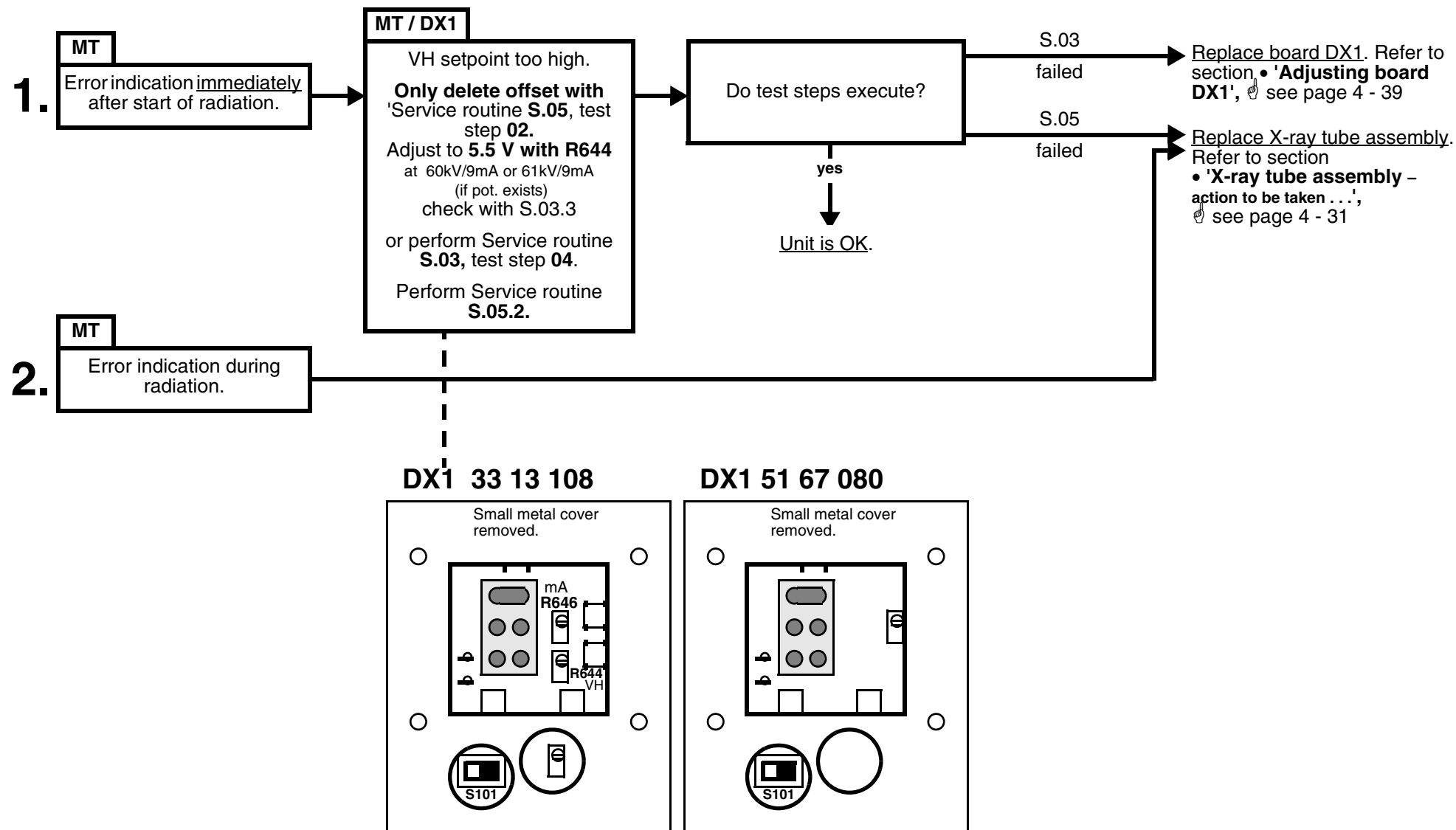
2. With Service routine S.03.4  
perform automatic setpoint align-  
ment.



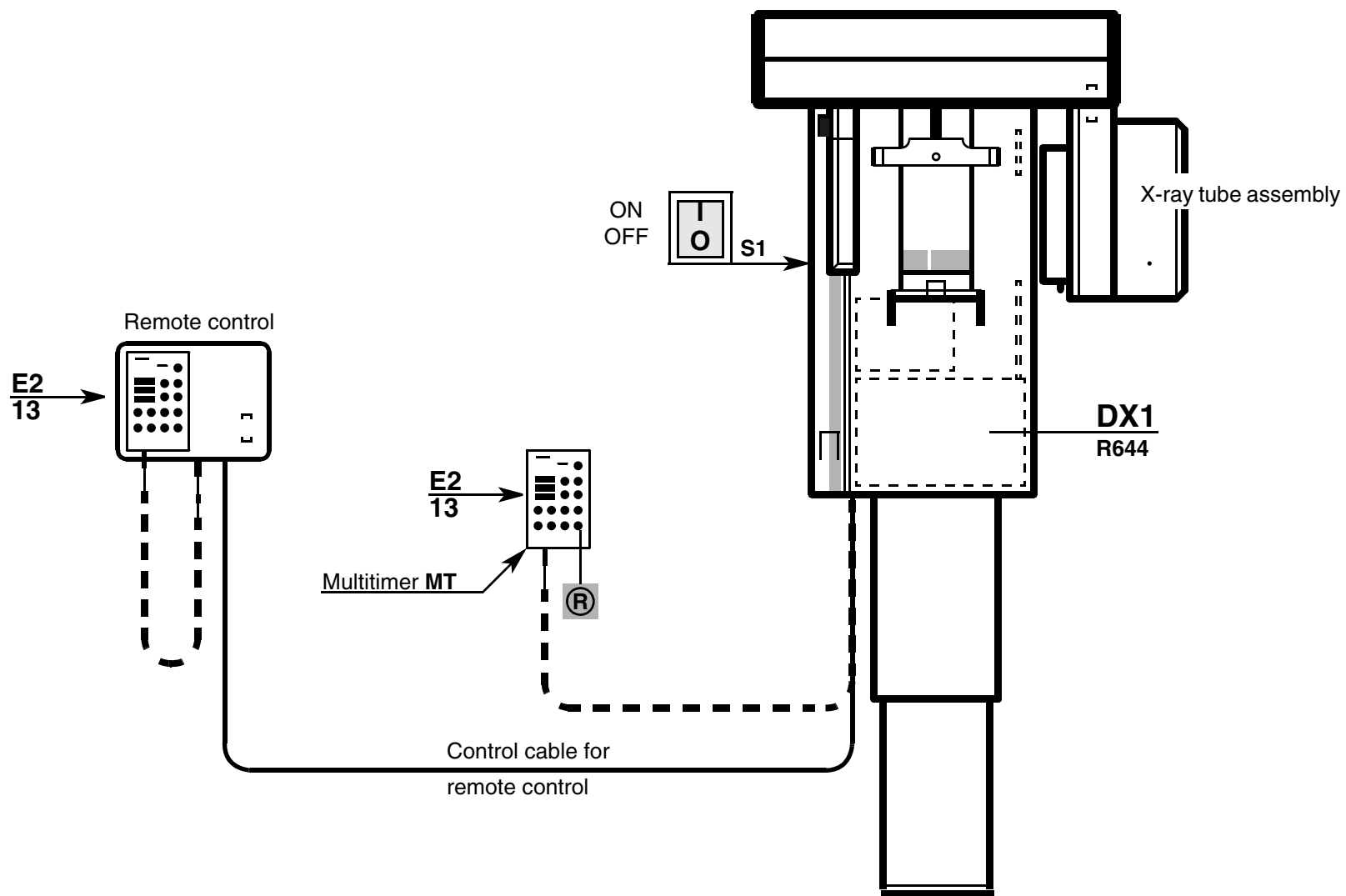
### 3.12 Correcting error of message E2 11: Anode voltage too high.



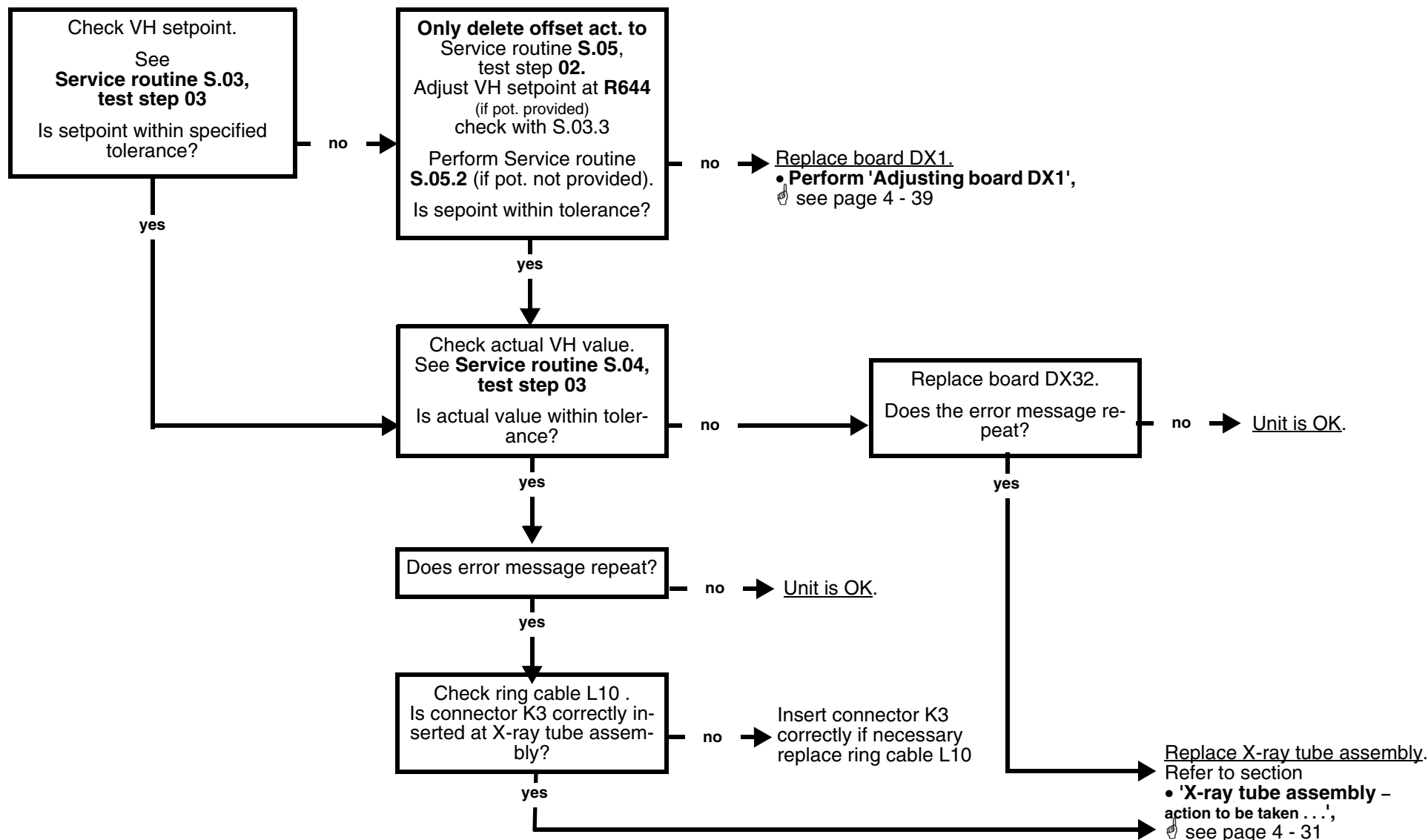
- Maximum anode current has been exceeded.



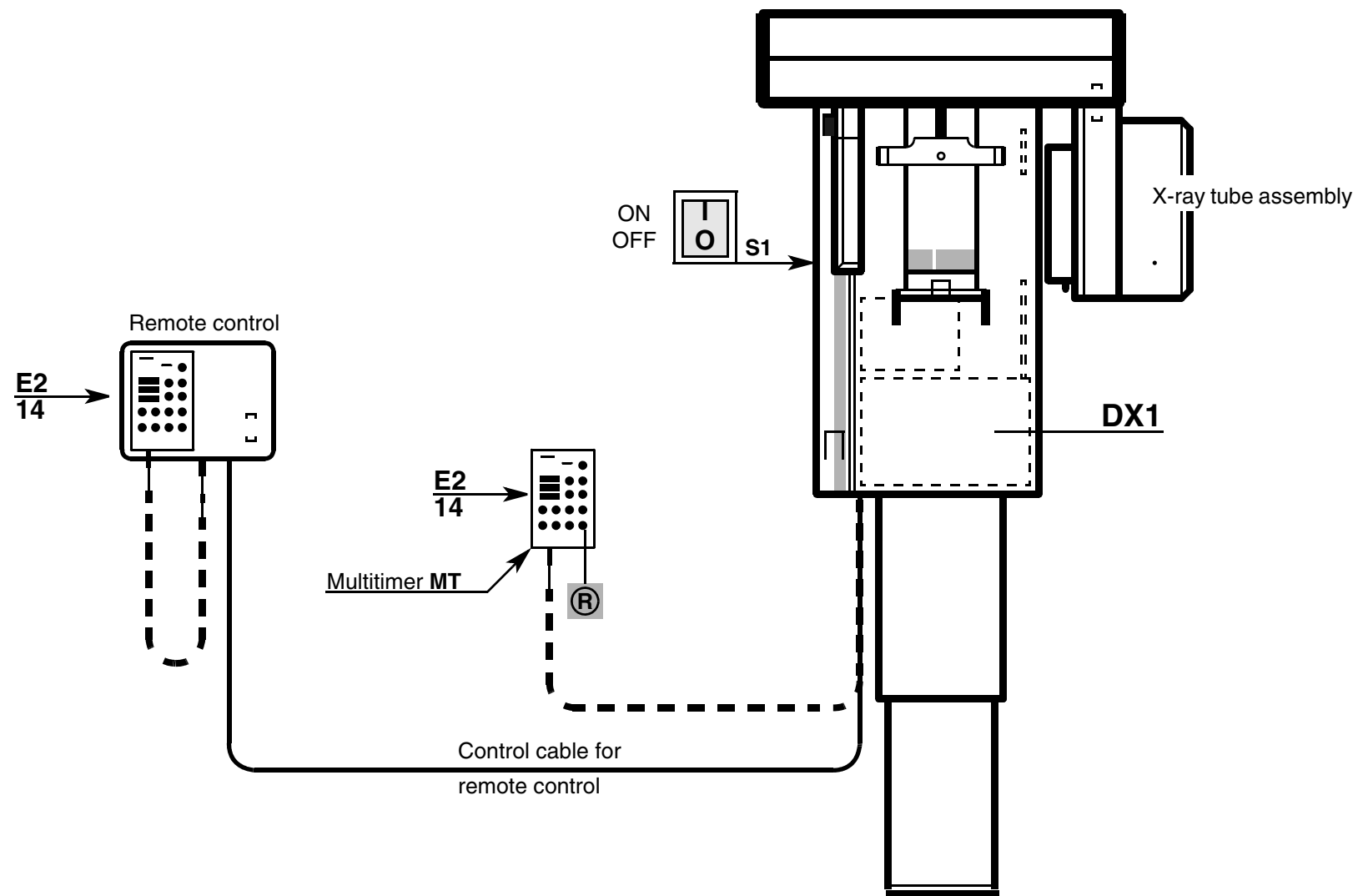
### 3.13 Correcting error of message E2 12: Anode current too high.



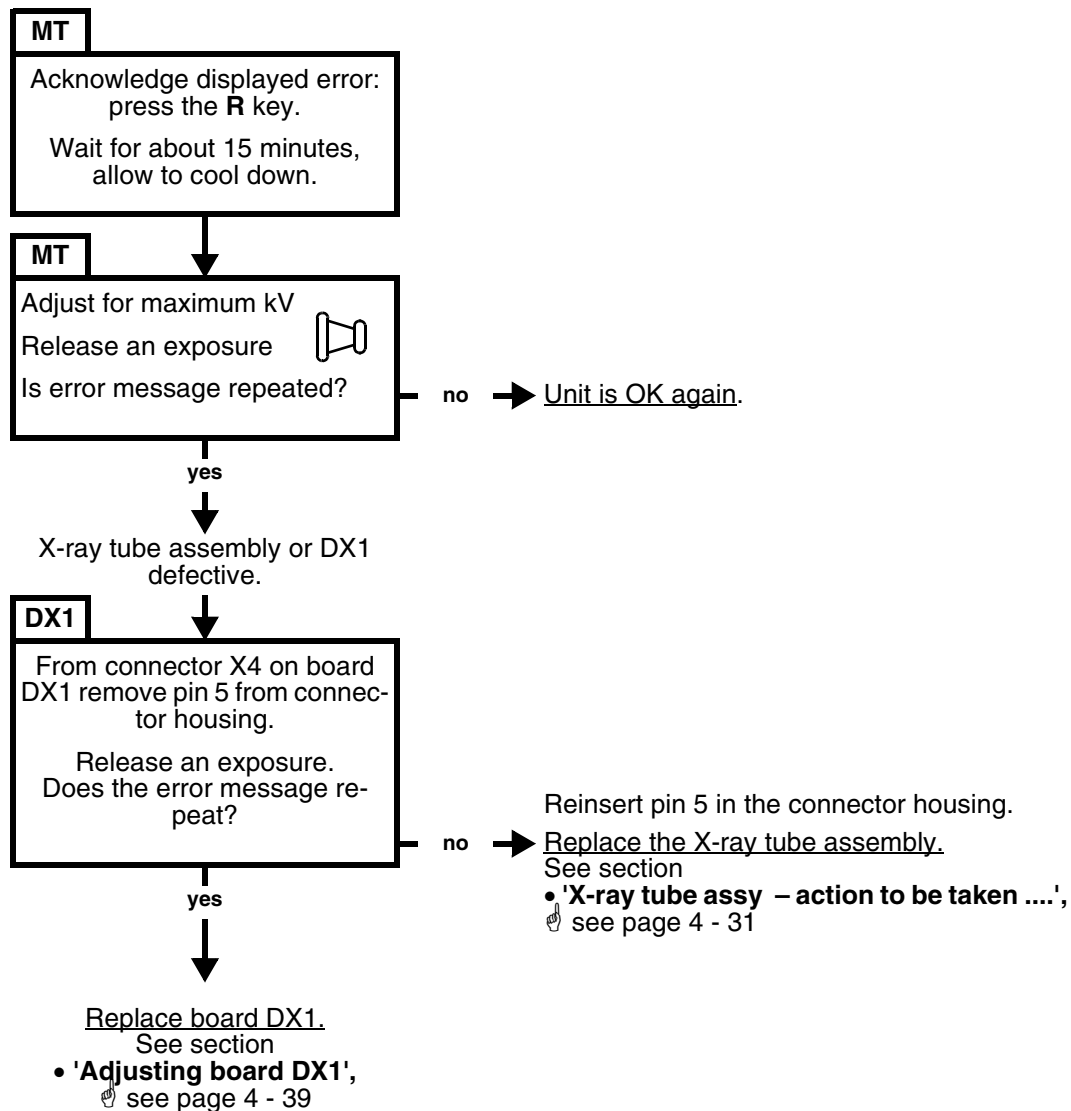
- Maximum filament voltage  $VH_{max}$  has been exceeded.



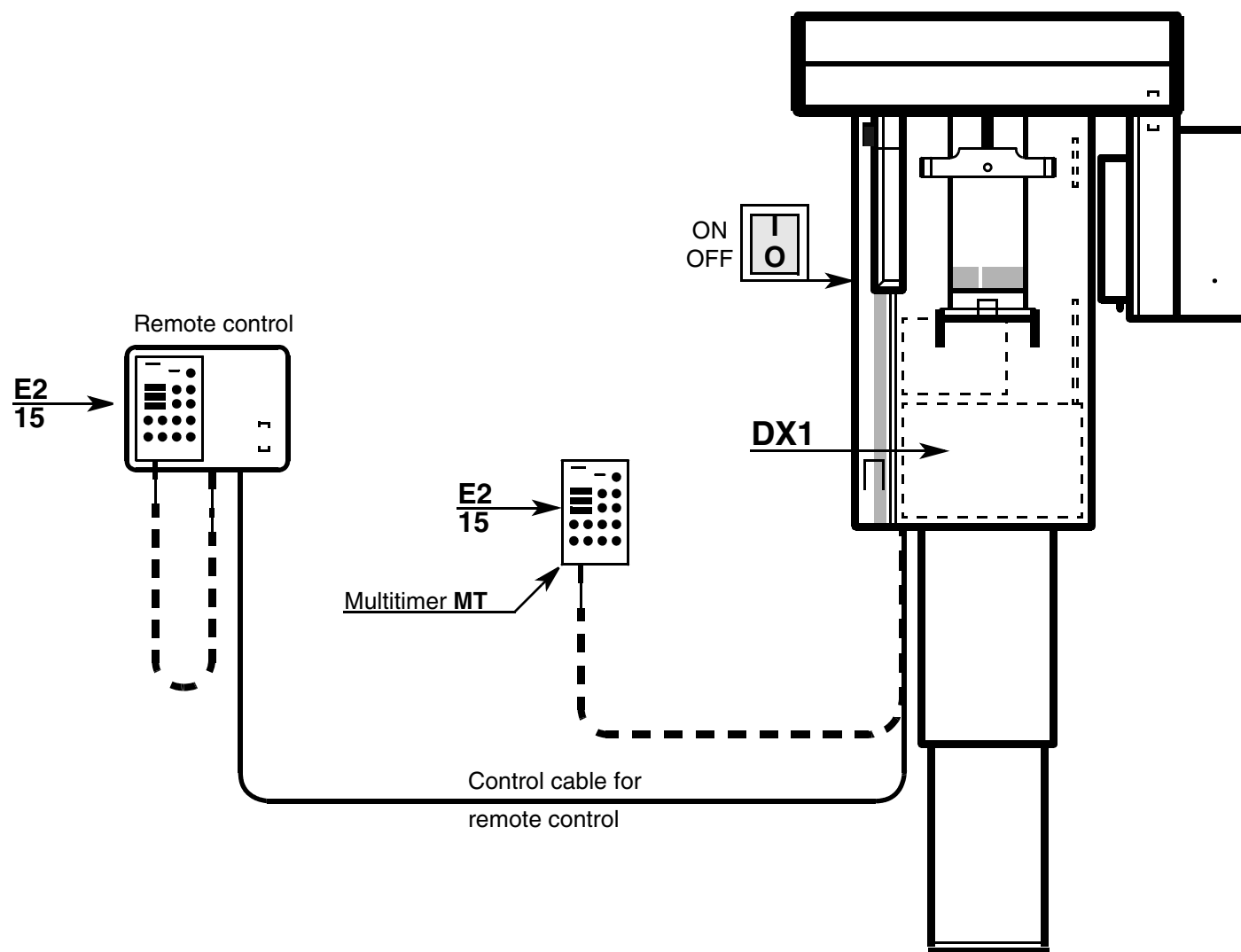
### 3.14 Correcting error of message E2 13: Filament voltage too high.



- Bridge short-circuit / transistors overheated.

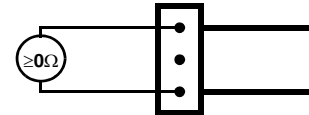
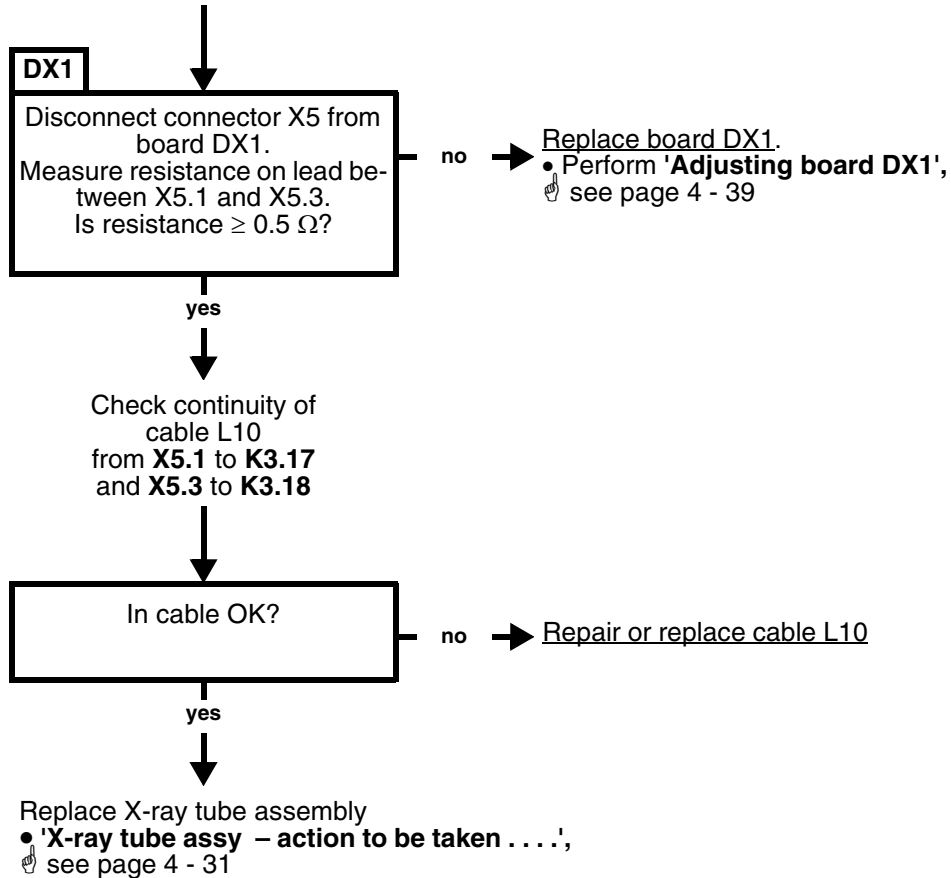


### 3.15 Correcting error of message E2 14: Short-circuit in bridge

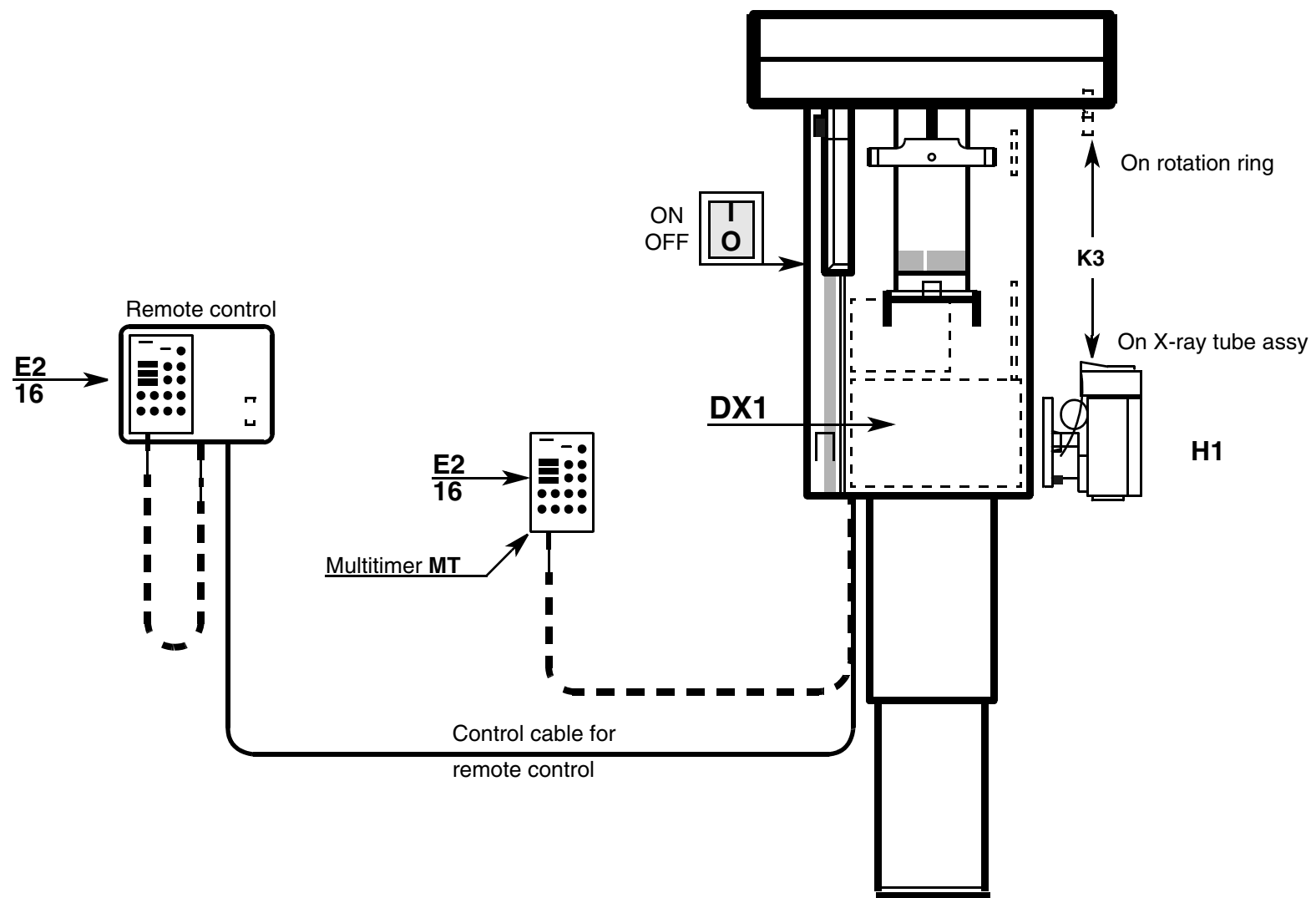




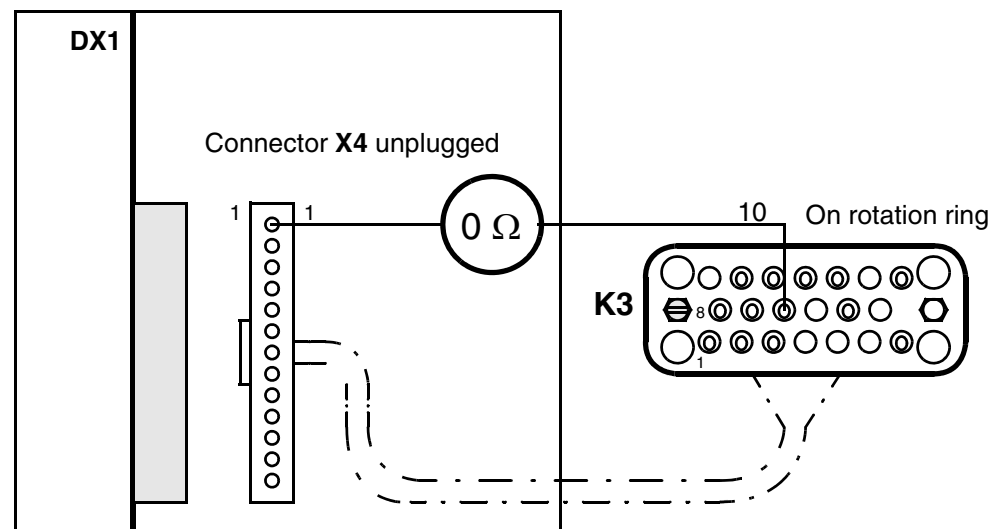
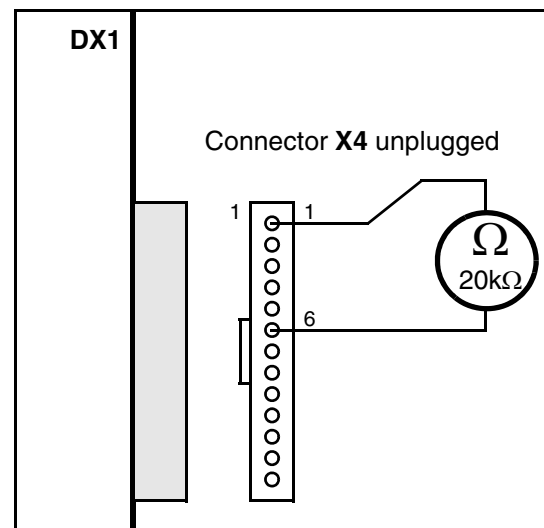
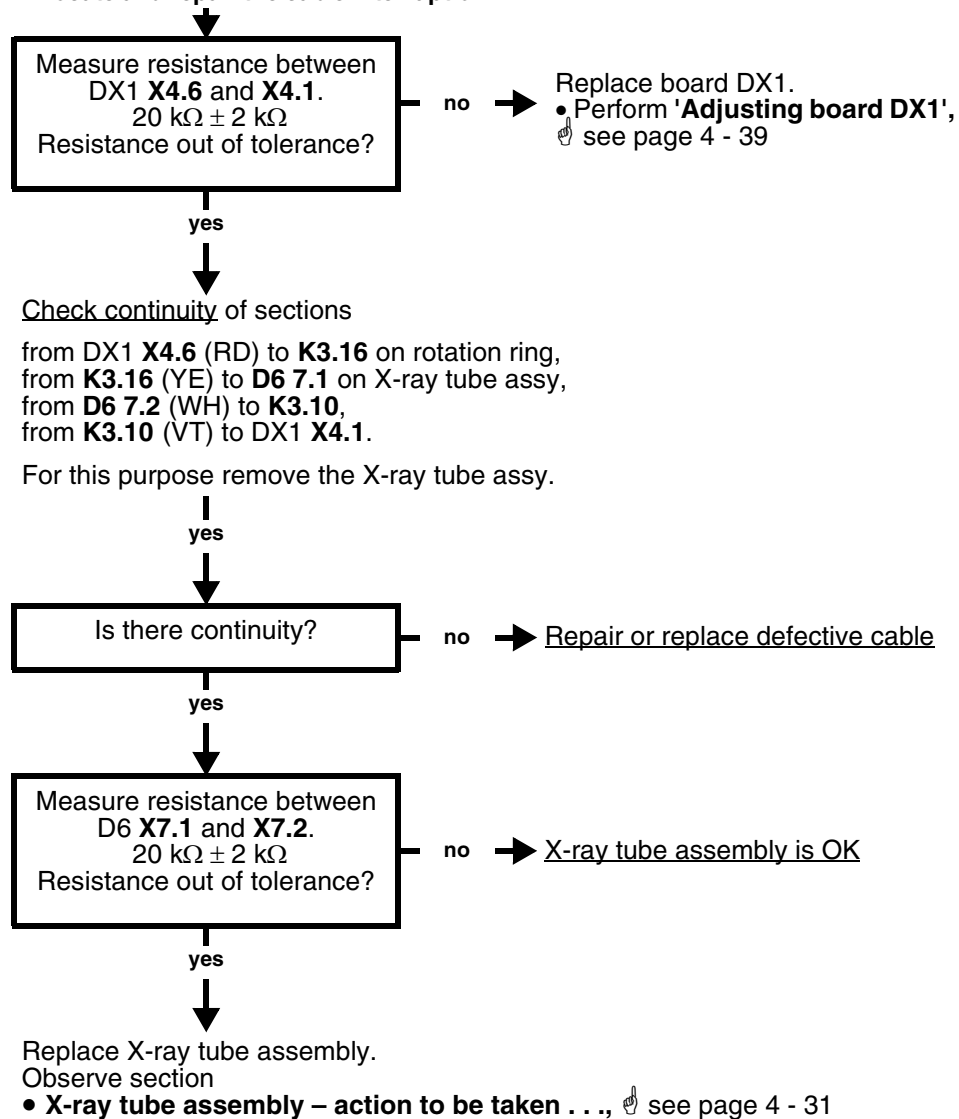
- Is connector K3 correctly inserted at X-ray tube assembly?



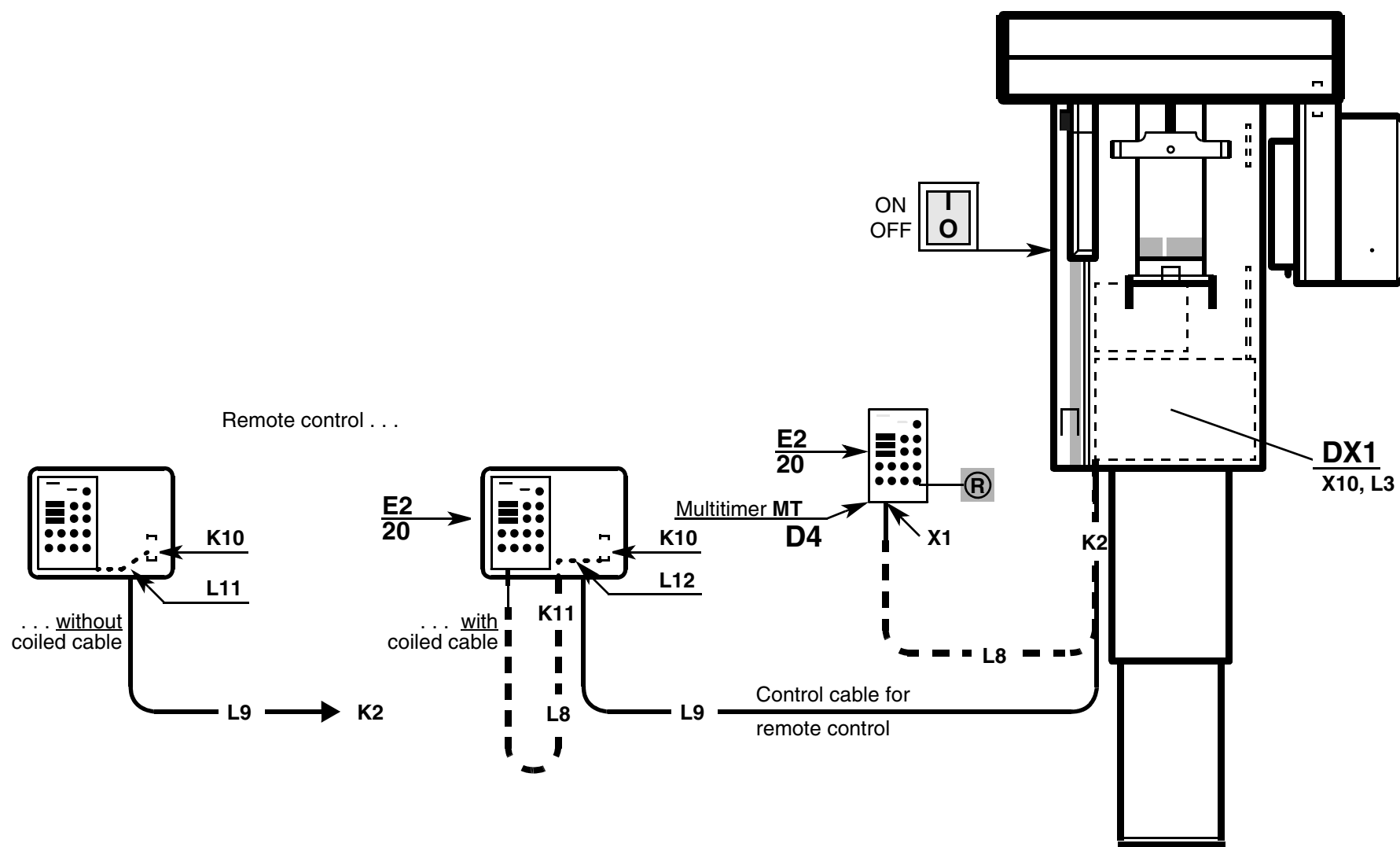
### 3.16 Correcting error of message E2 15: $VH_{max}$ continuously present.



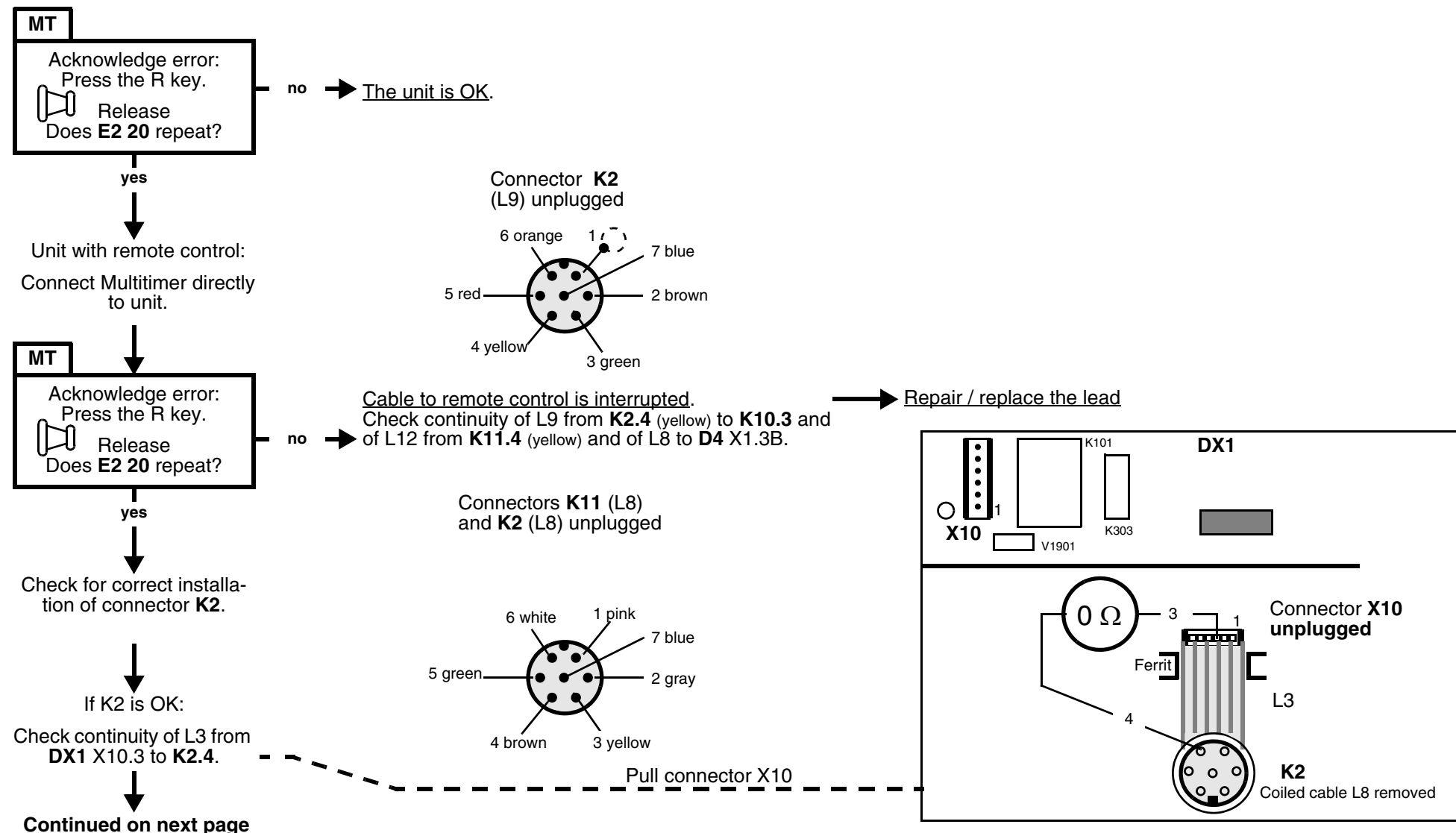
- Is connector K3 correctly inserted at the X-ray tube assembly?
- Locate and repair the cable interruption.



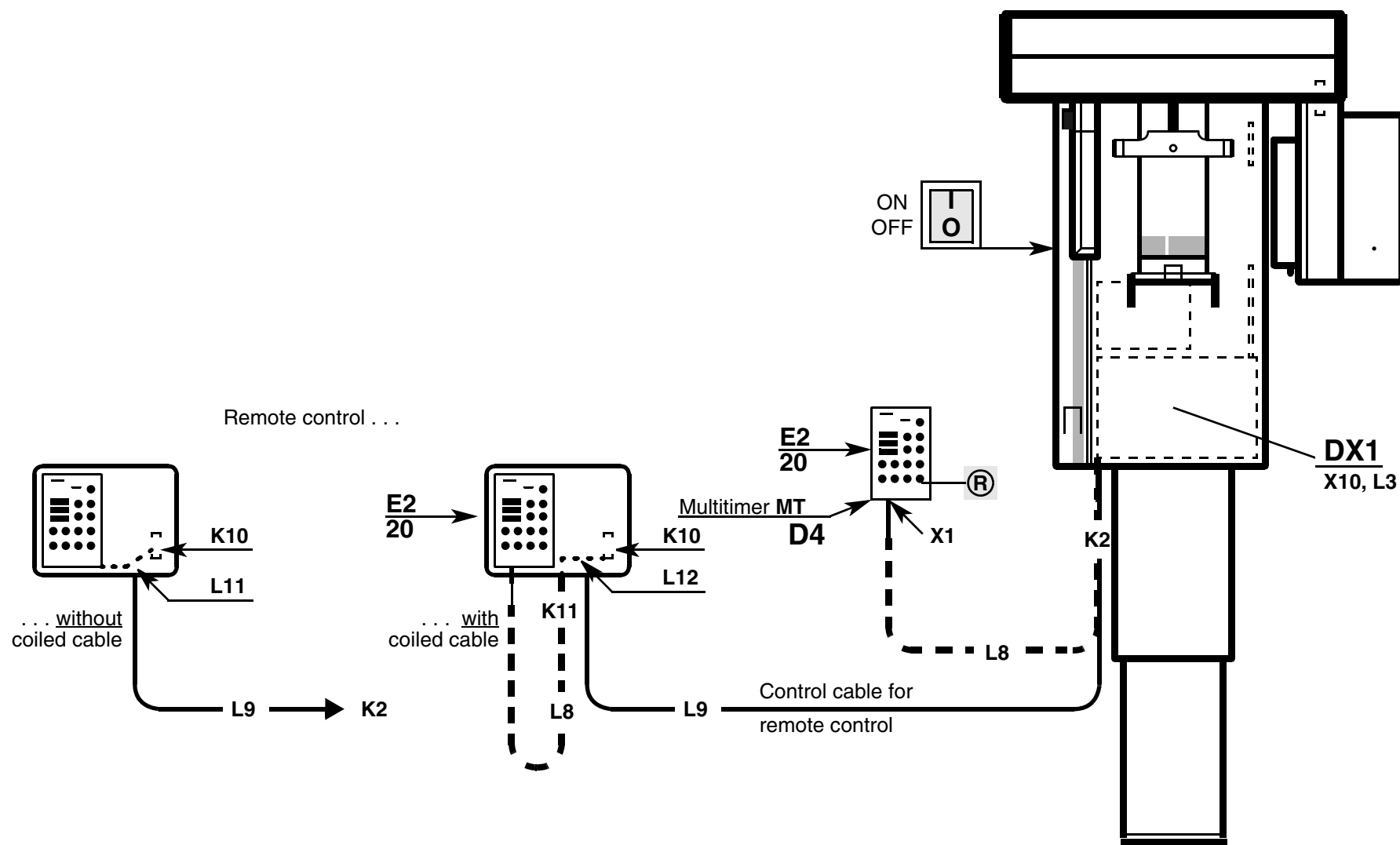
### 3.17 Correcting error of message E2 16: kV<sub>ACTUAL</sub> – Cable is interrupted.



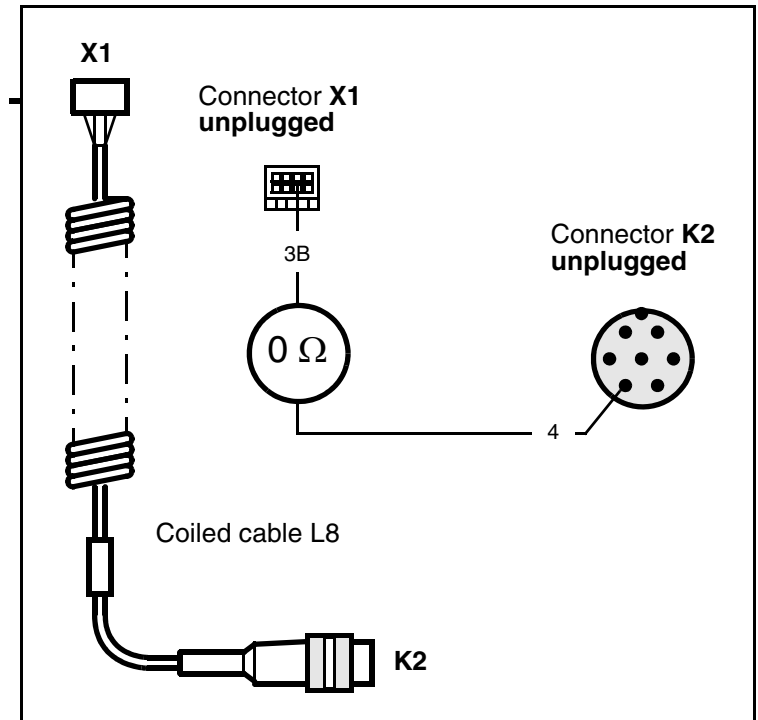
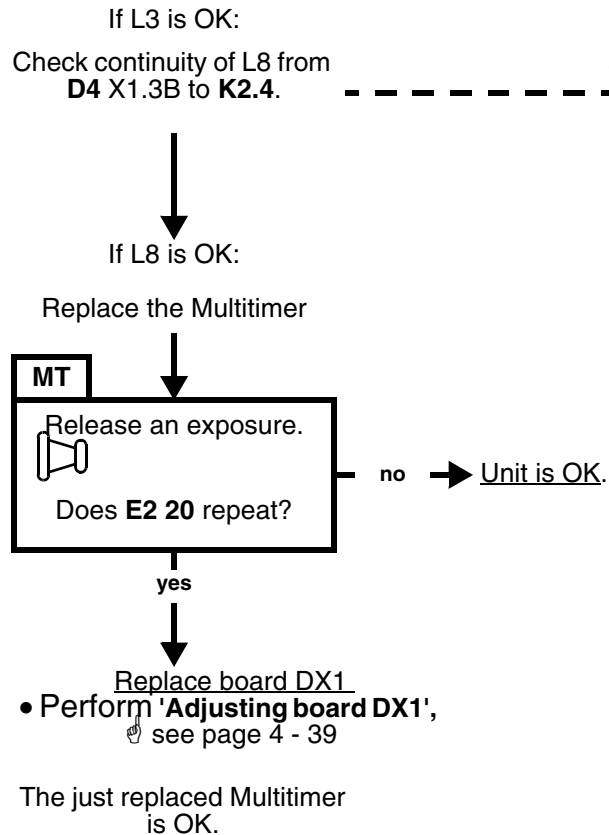
- X-ray room with door contact: Close the door and check proper function of door contact!



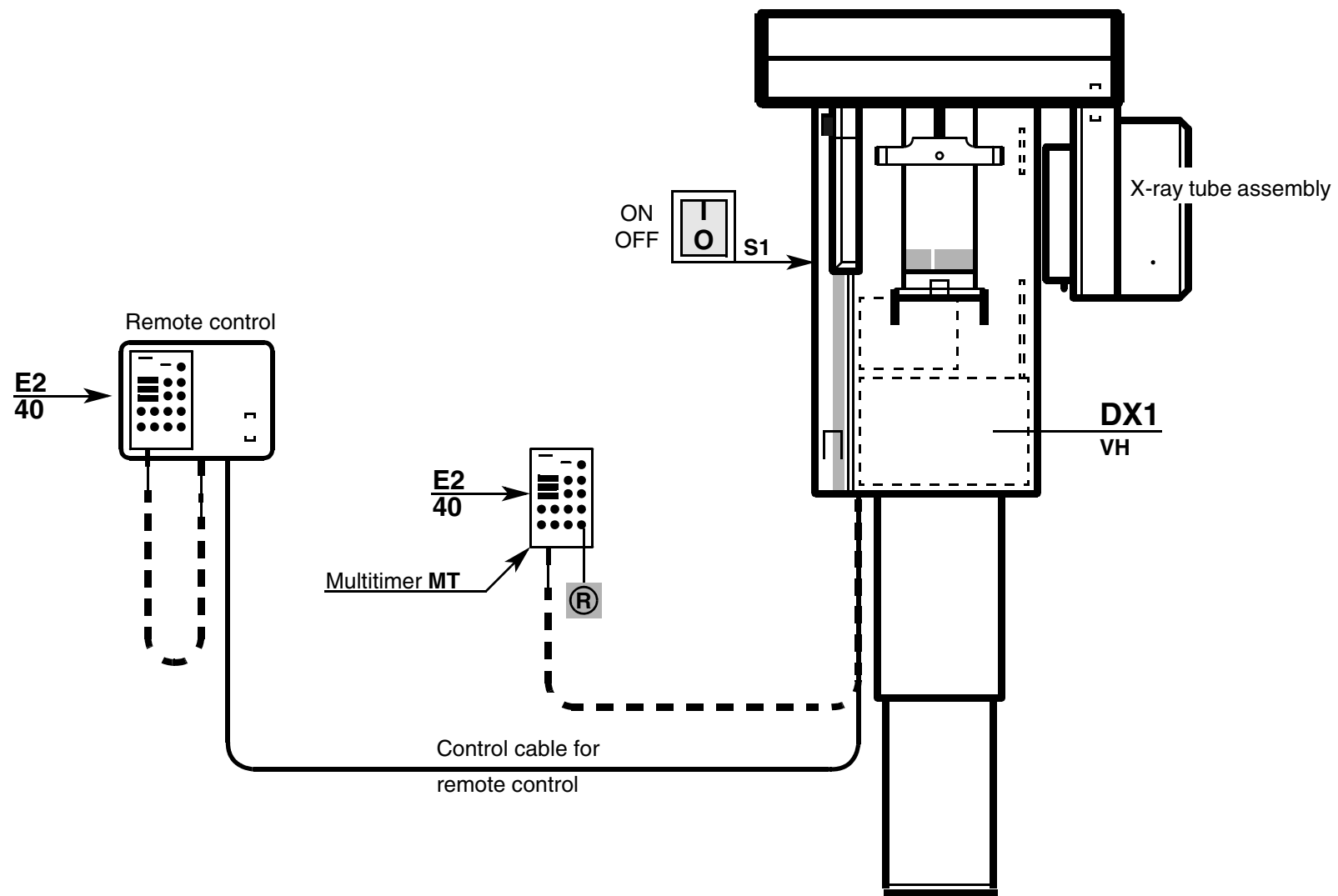
### 3.18 Correcting error of message E2 20: Interrupted exposure lead in Multitimer cable.



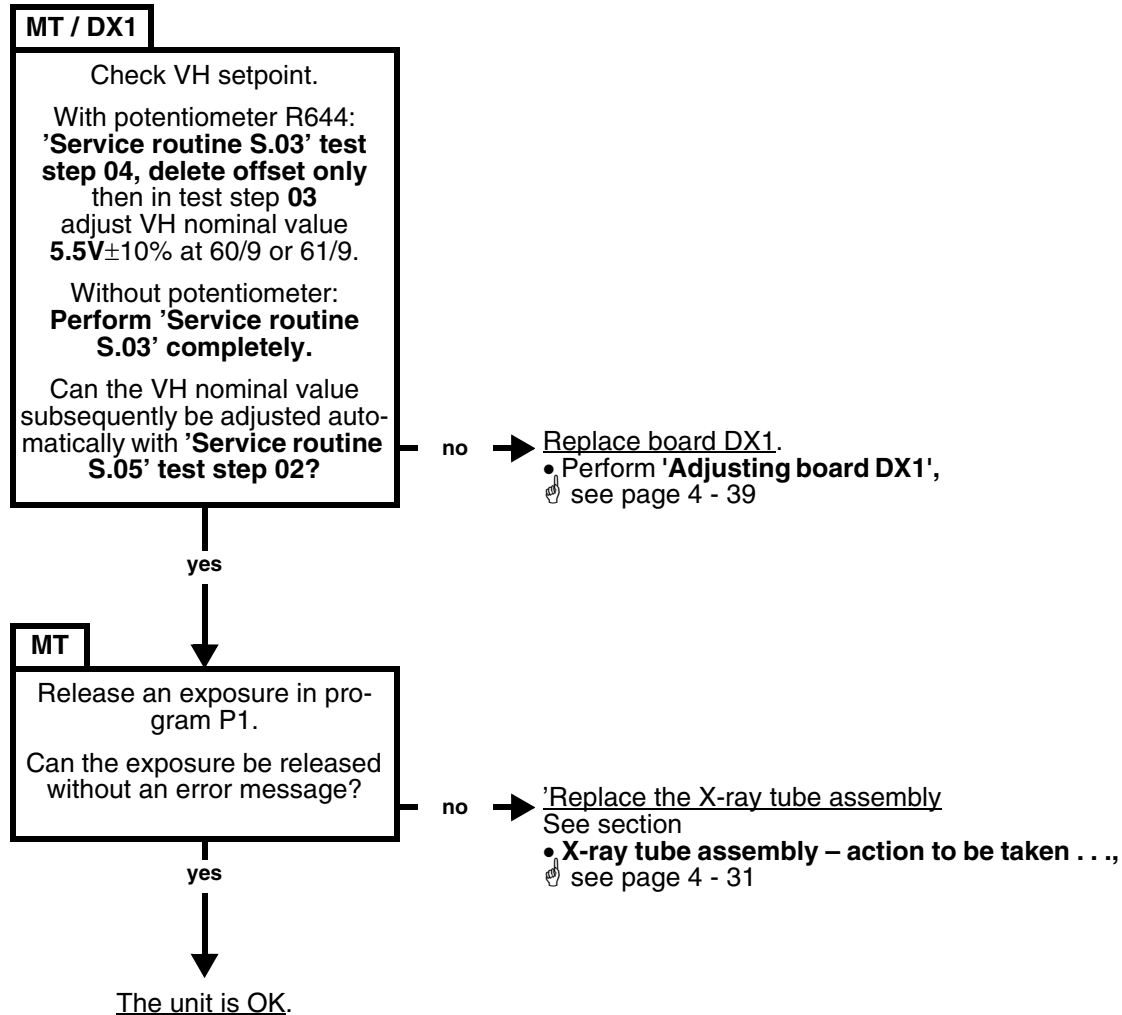
continued



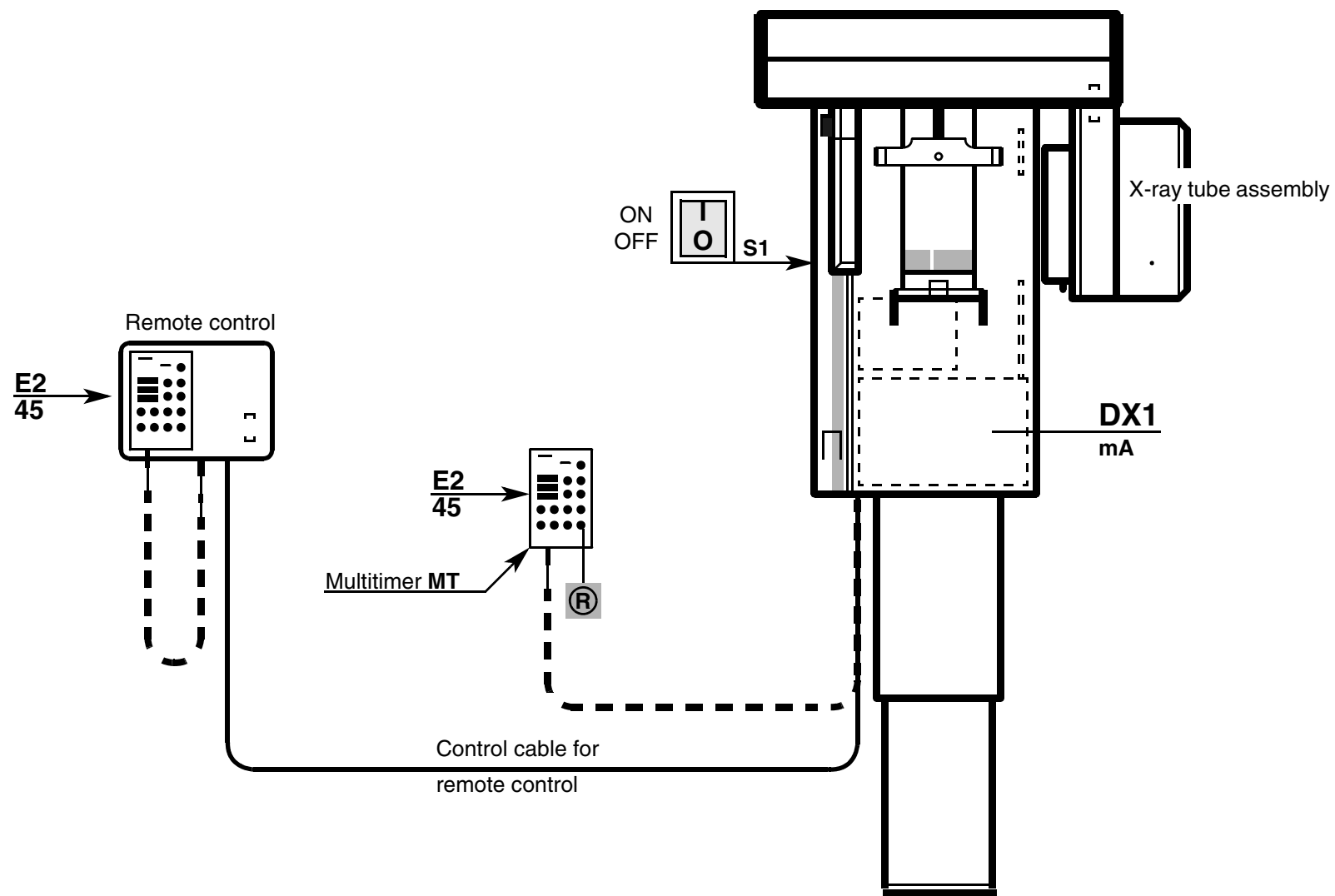
### 3.18 Correcting error of message E2 20: Exposure lead in Multitimer cable interrupted

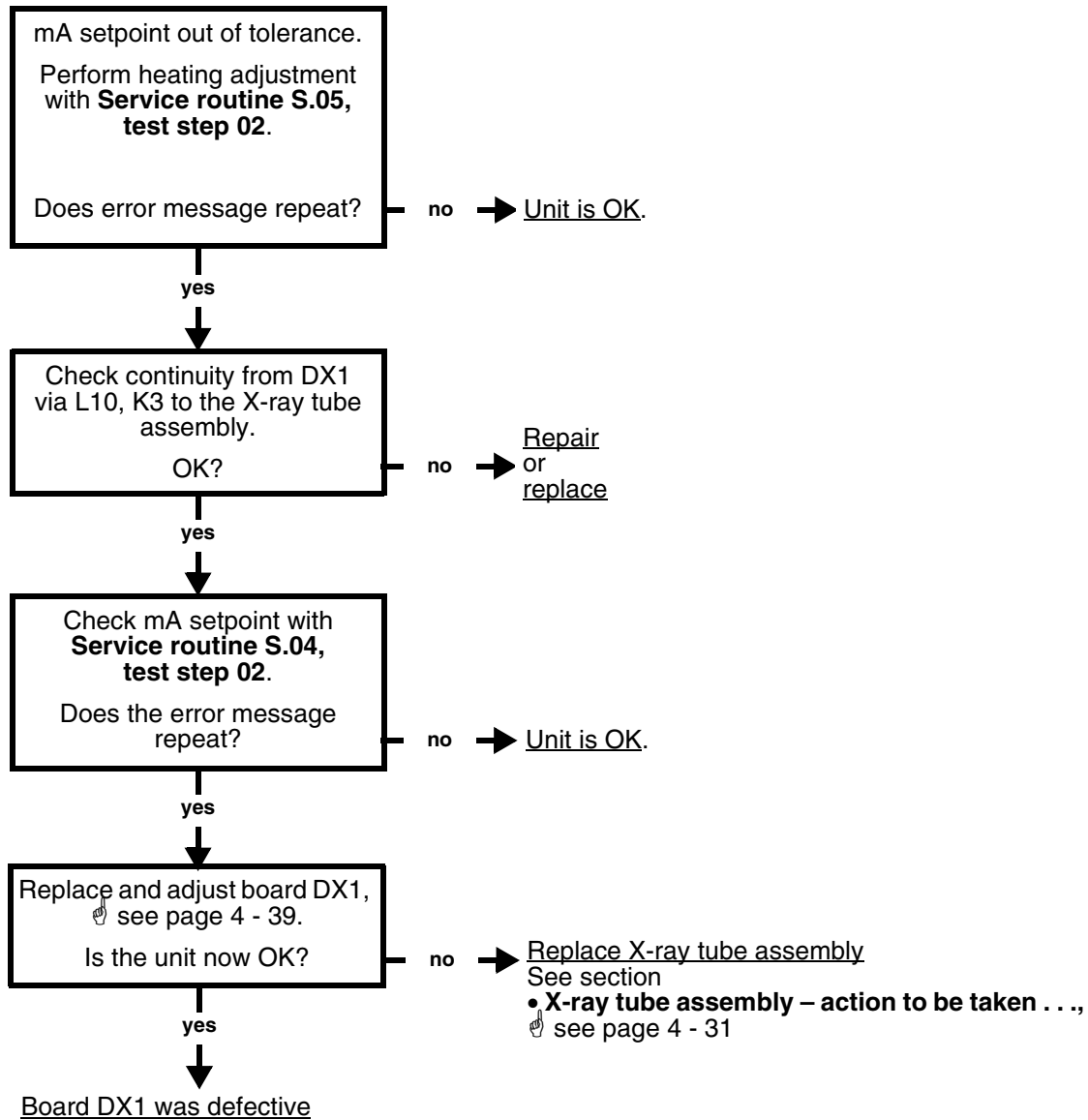




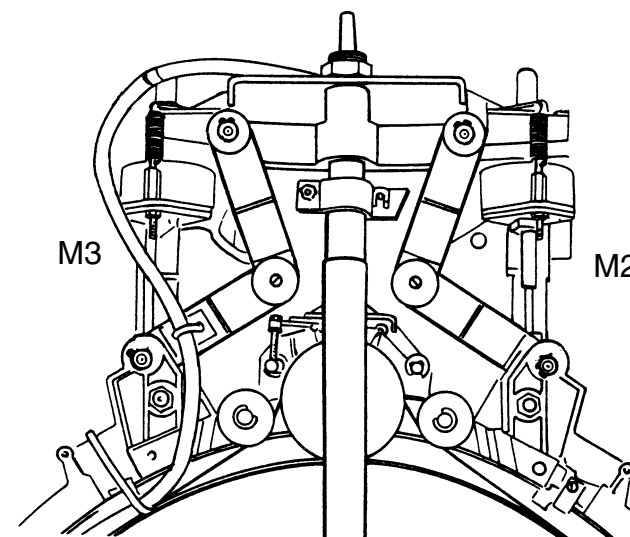
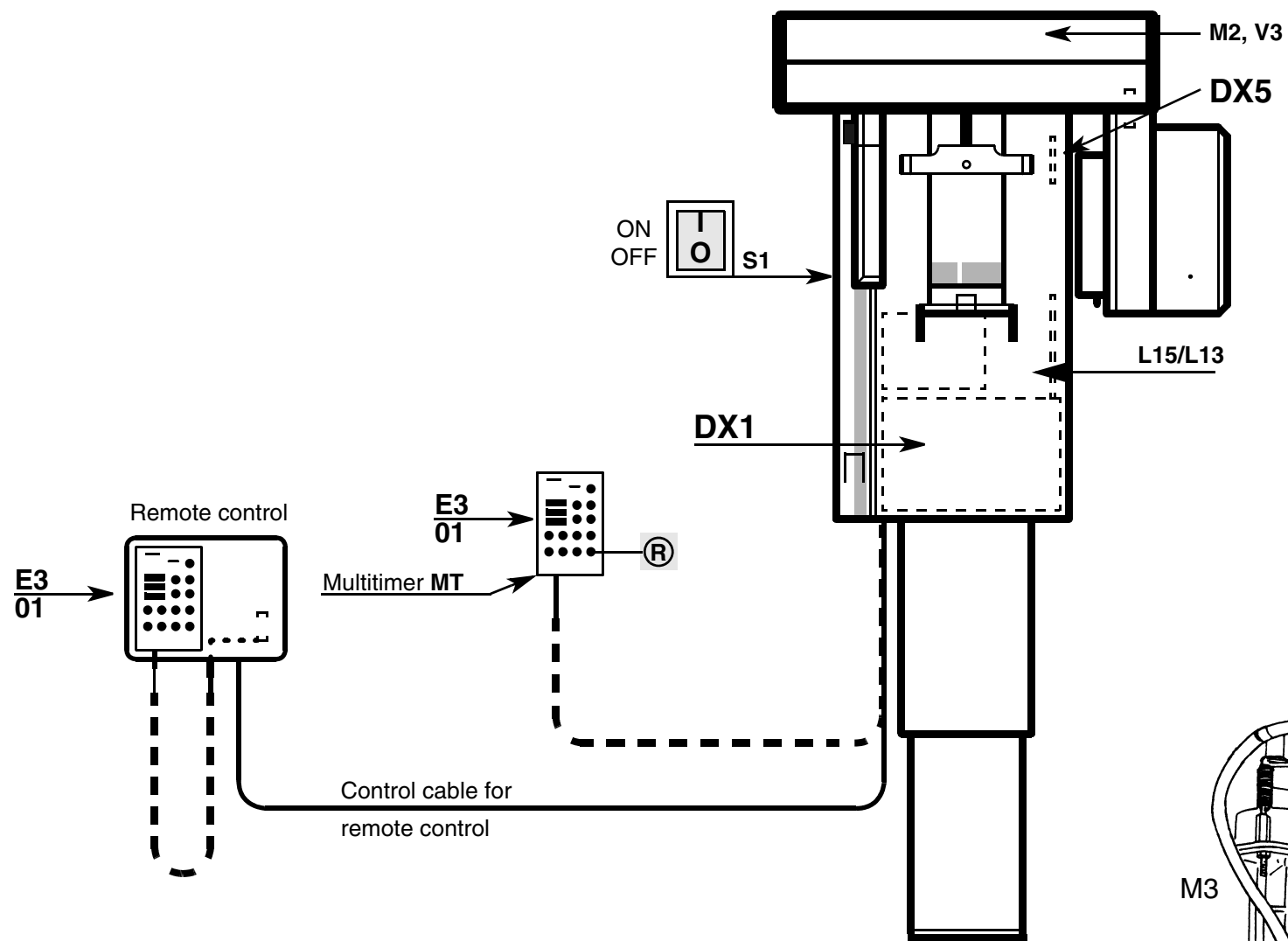


### 3.19 Correcting error of message E2 40: VH setpoint out of tolerance.

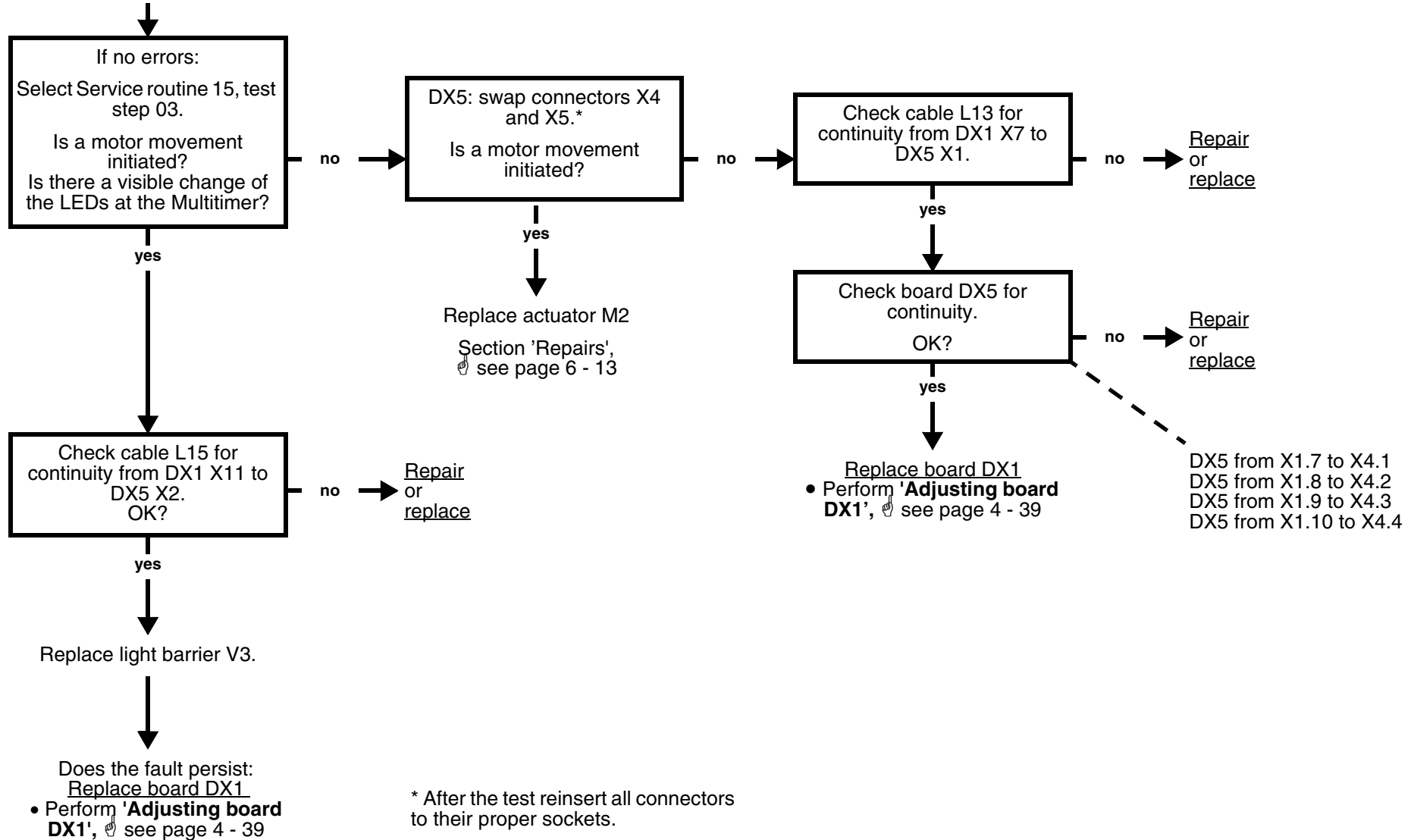




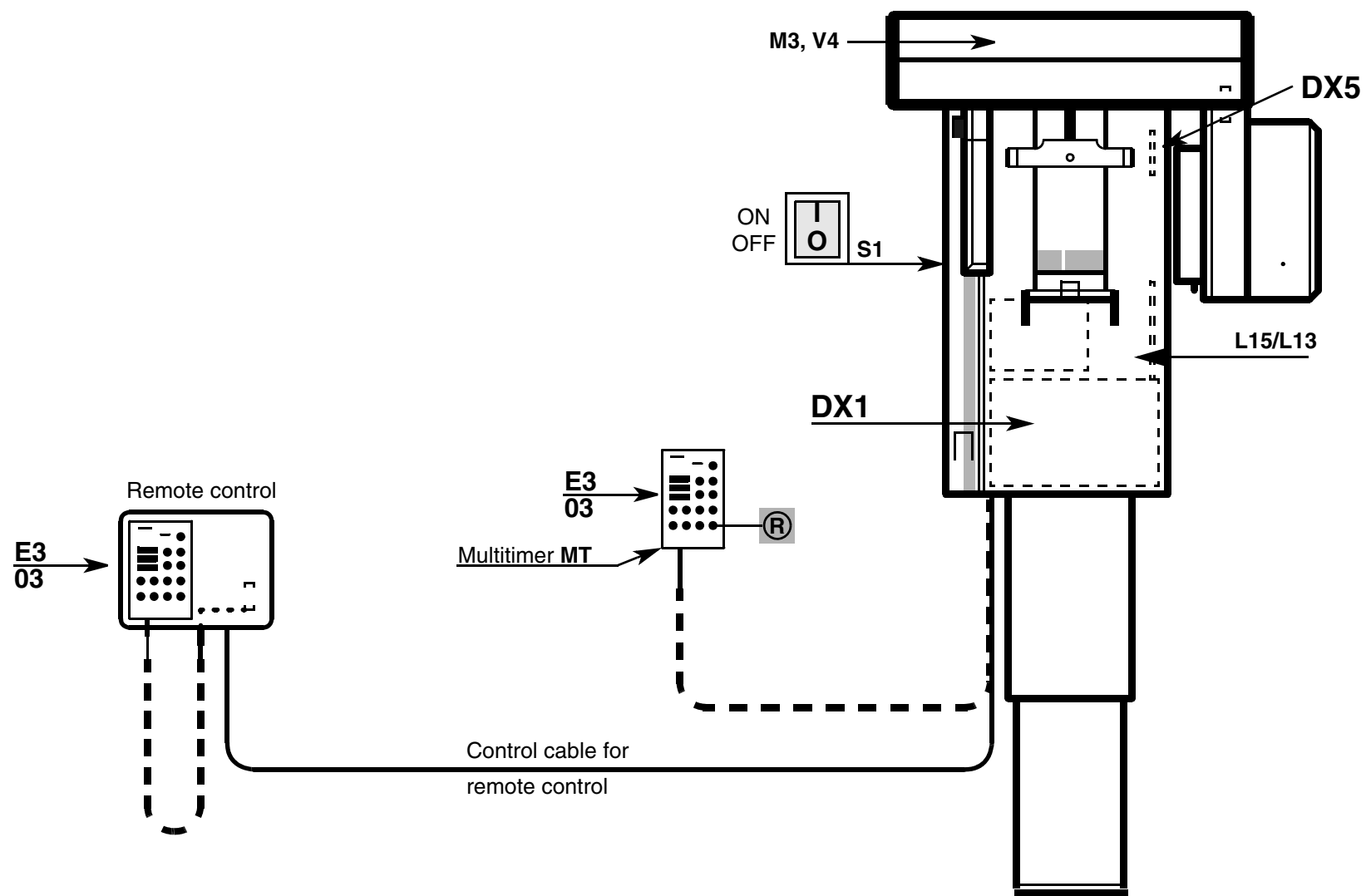
### 3.20 Correcting error of message E2 45: mA setpoint out of tolerance.



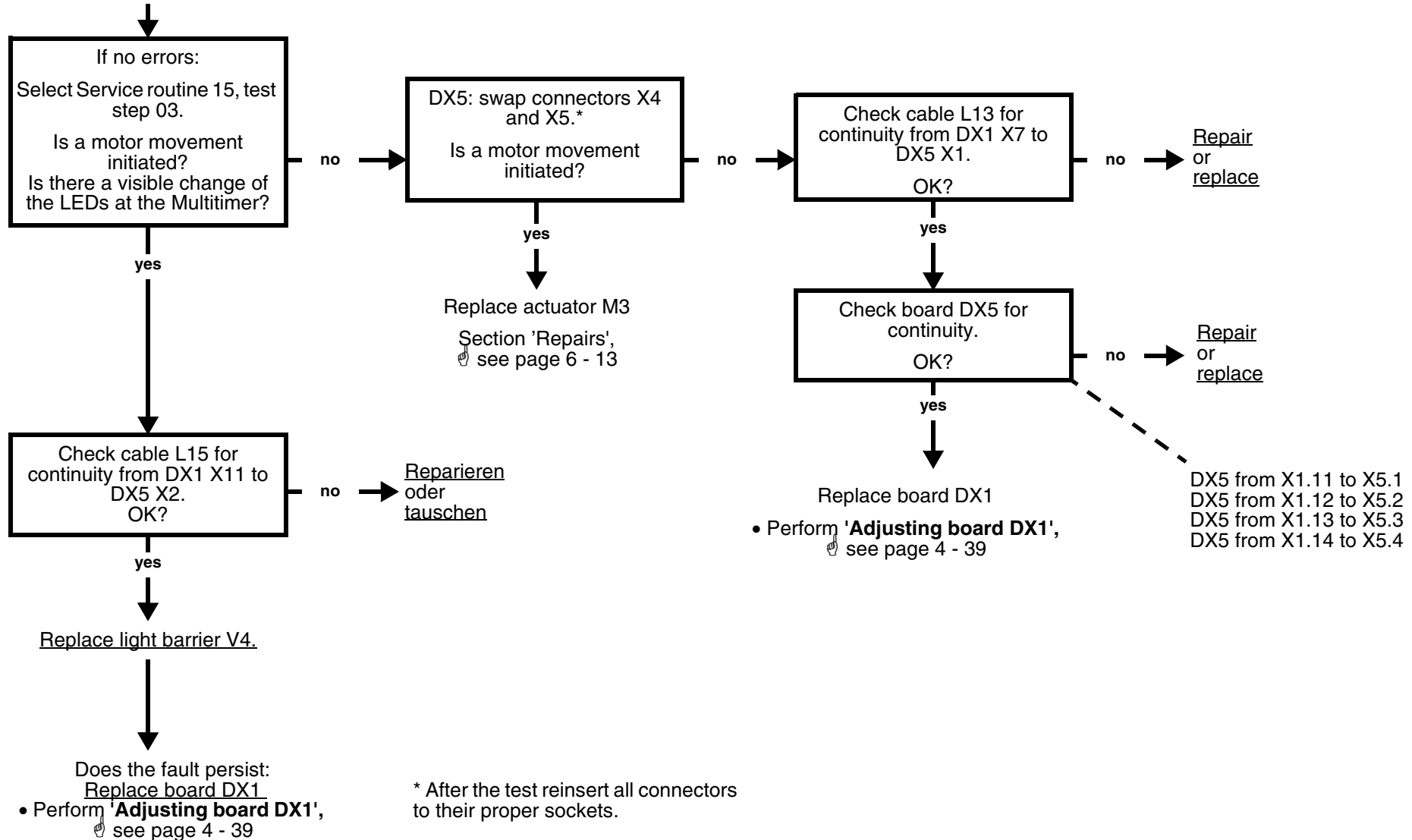
- Are connectors X1, X2, X4 (M2) and X12 (V3) on board DX5 and connectors X7 and X11 on board DX1 correctly inserted?
- Are supply voltages present on DX1?! → LEDs V10-14 and V31, V40 on DX32 must light up!



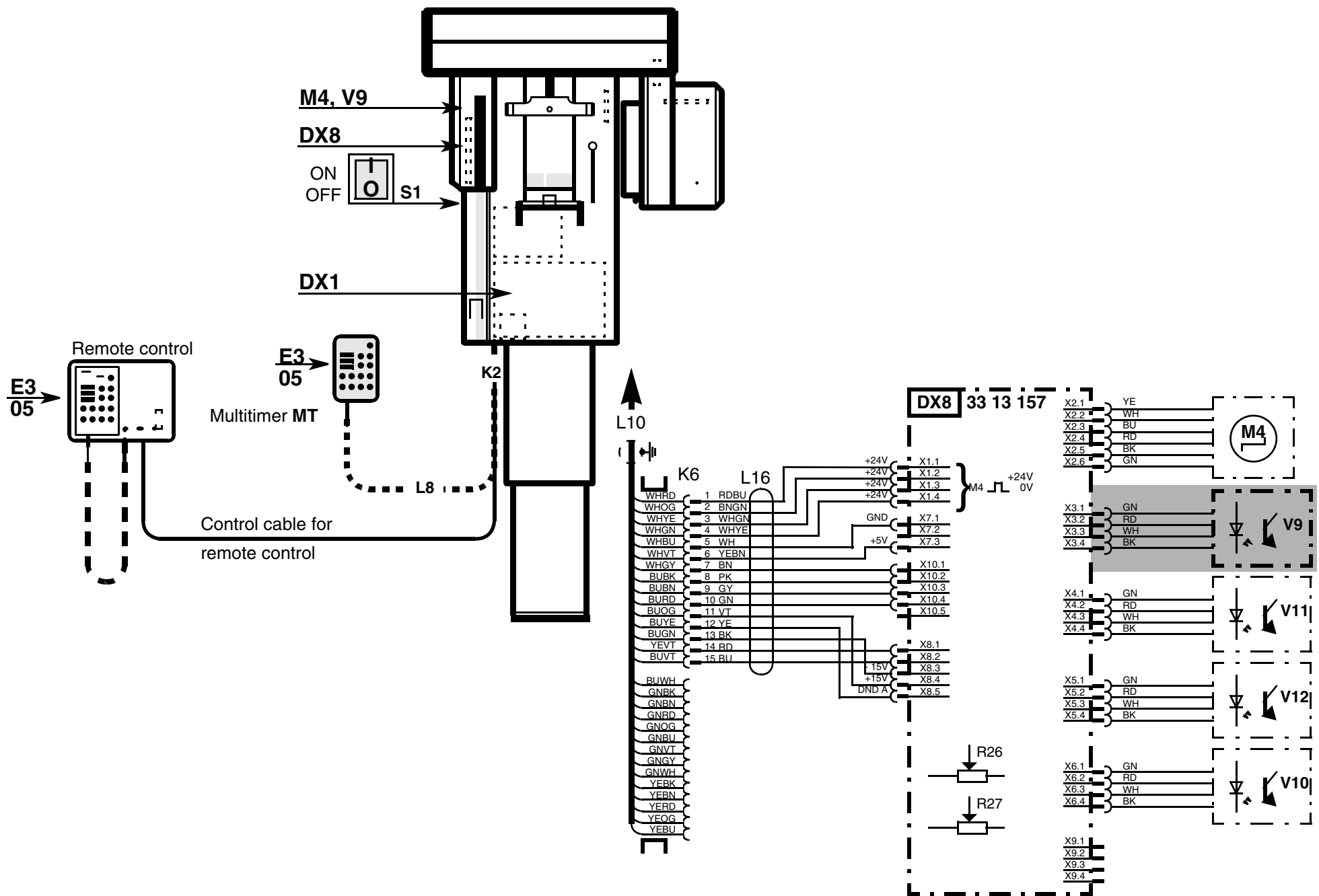
### 3.21 Correcting error of messages E3 01, E3 02: Actuator M2 has not left/reached the tripping position.



- Are connectors X1, X2, X5(M3) and X13(V4) on board DX5, and connectors X7 and X11 on board DX1 correctly inserted?!
- Are supply voltages present on DX1?! → LEDs V10-14 and V31, V40 on DX32 must light up!

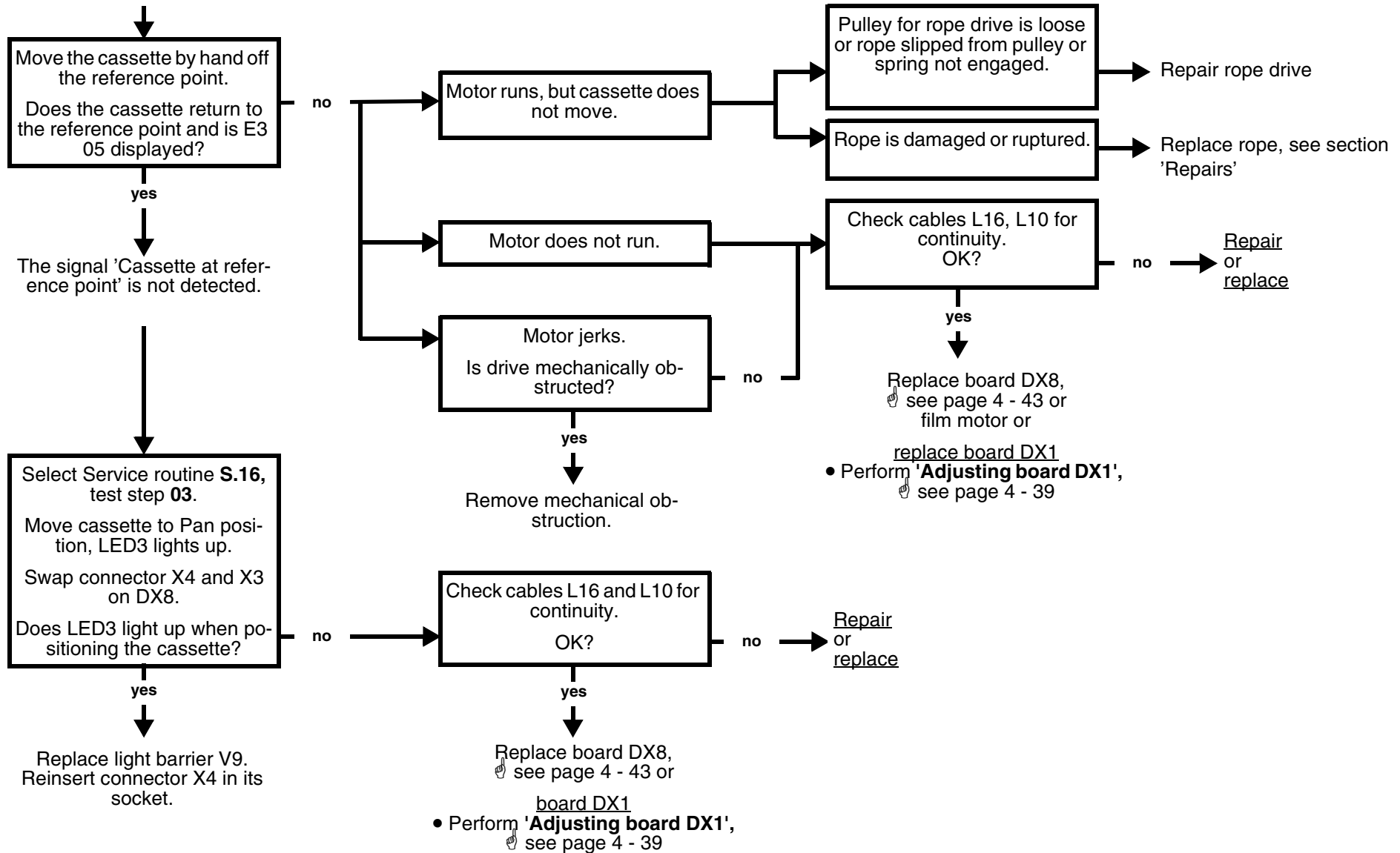


### 3.22 Correcting error of messages E3 03, E3 04: Actuator M3 has not left/reached the tripping position.

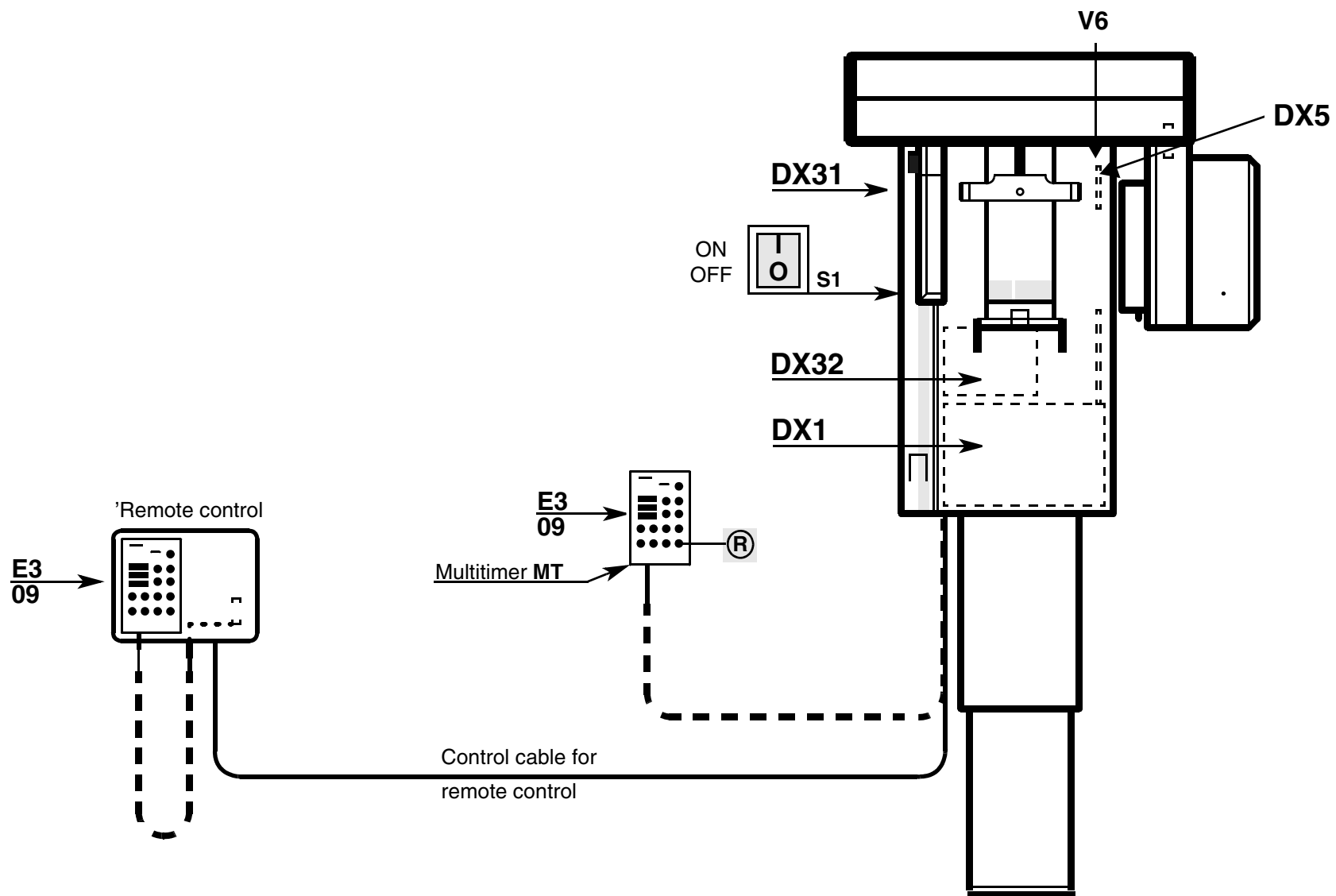




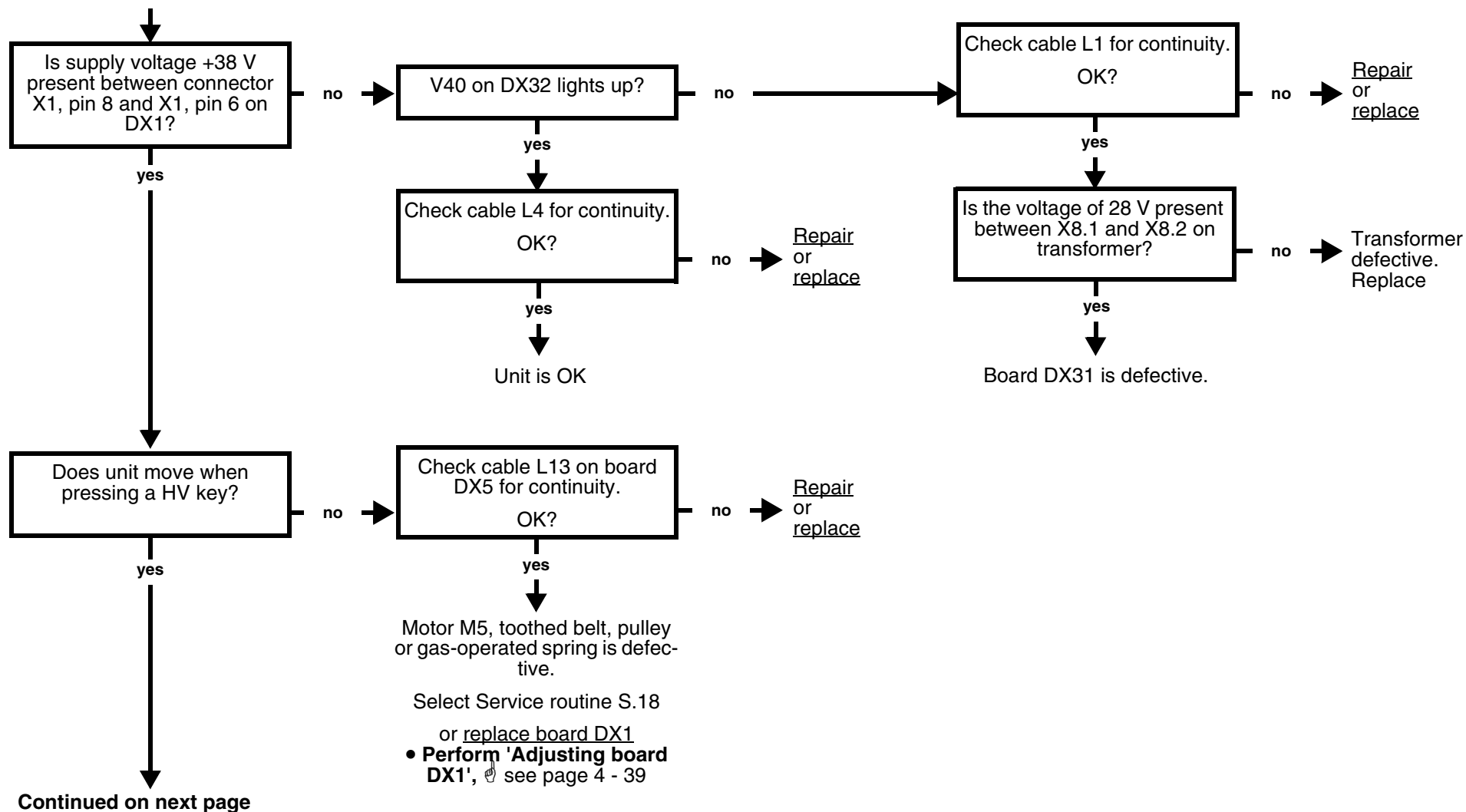
- Cassette holder must be set for Pan mode, service routine must not be selected, no help message or error message must be displayed.



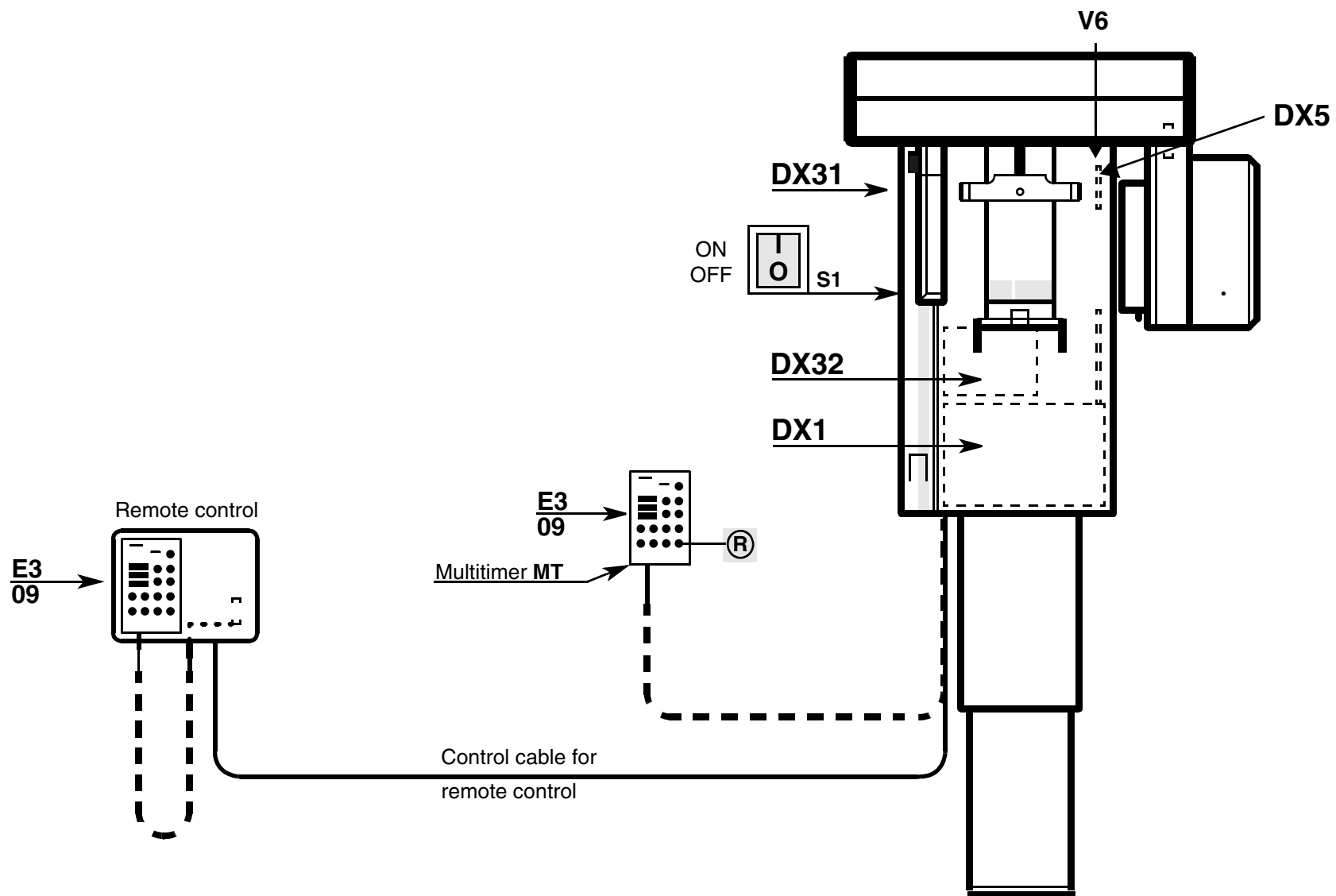
### 3.23 Correcting error of messages E3 05, E3 06: Cassette carriage has not left/reached the reference point.

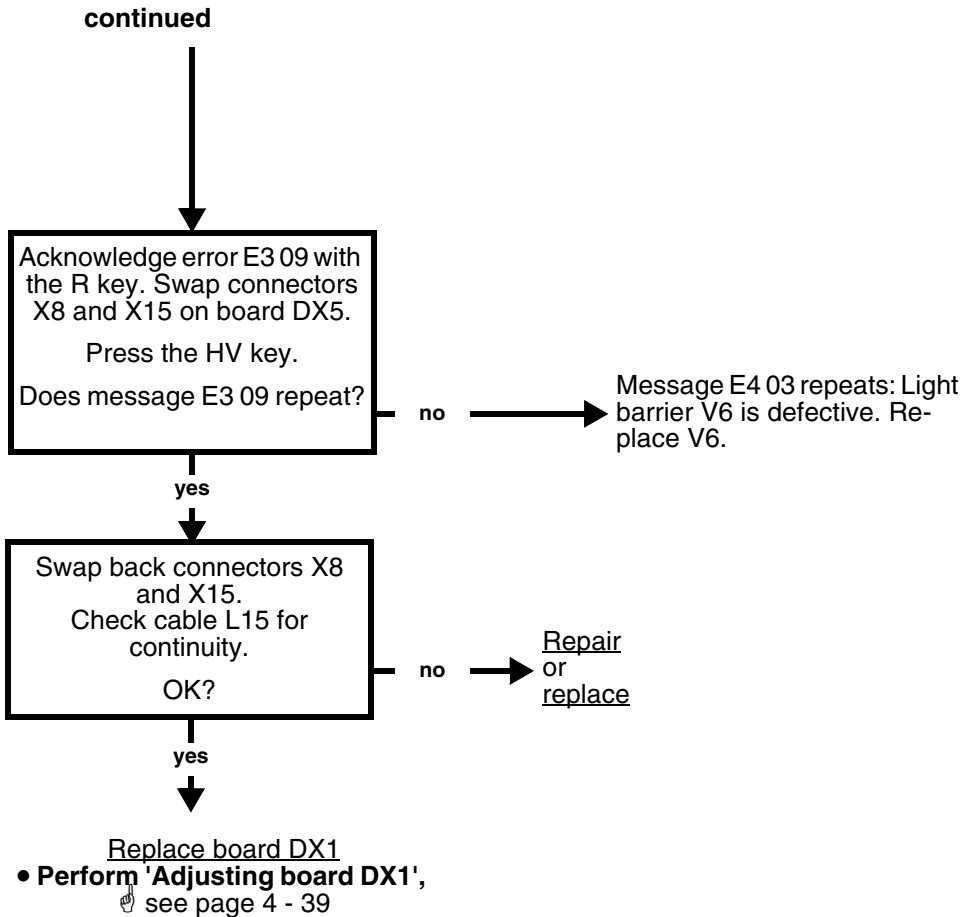


- Are connectors X7 and X8/X15 on board DX5 correctly inserted or are connectors swapped?
- Circuit breaker F2 on DX31 tripped?

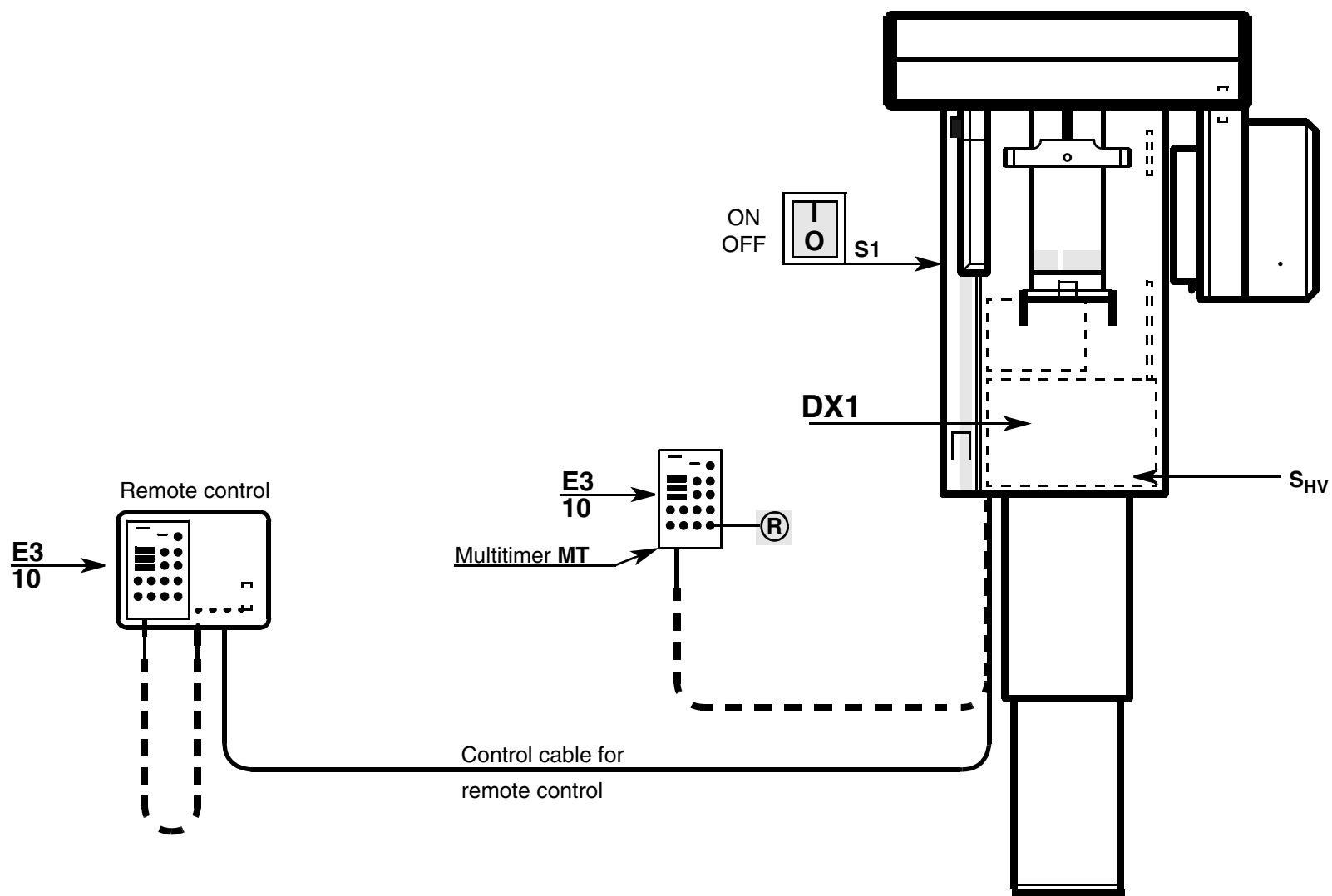


### 3.24 Correcting error of message E3 09: Pulses for height adjustment are not within allowed time.

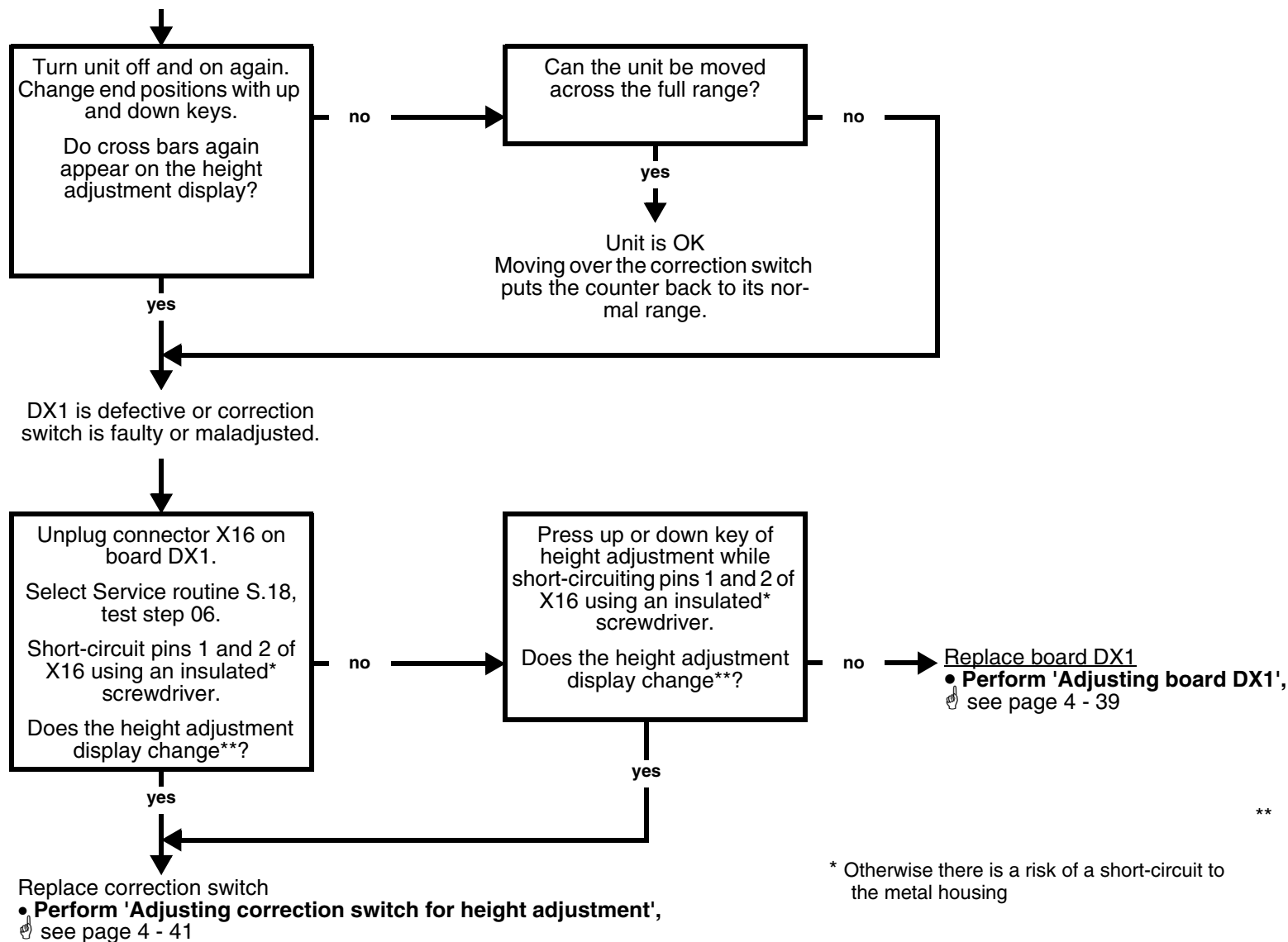




### 3.24 Correcting error of message E3 09: Pulses for height adjustment are not within allowed time

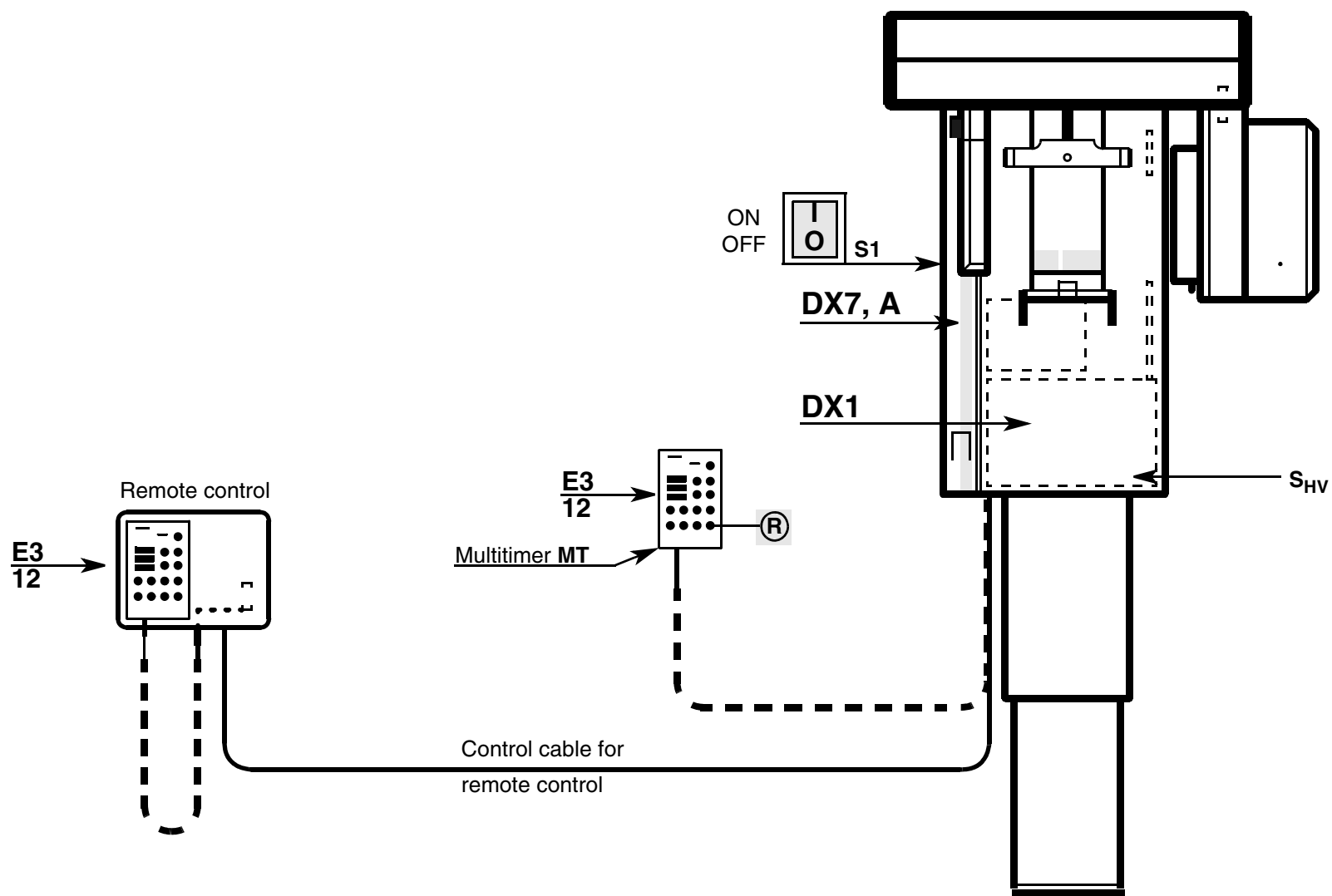


- Are connectors X7, X11 and X16 on board DX1 correctly inserted?



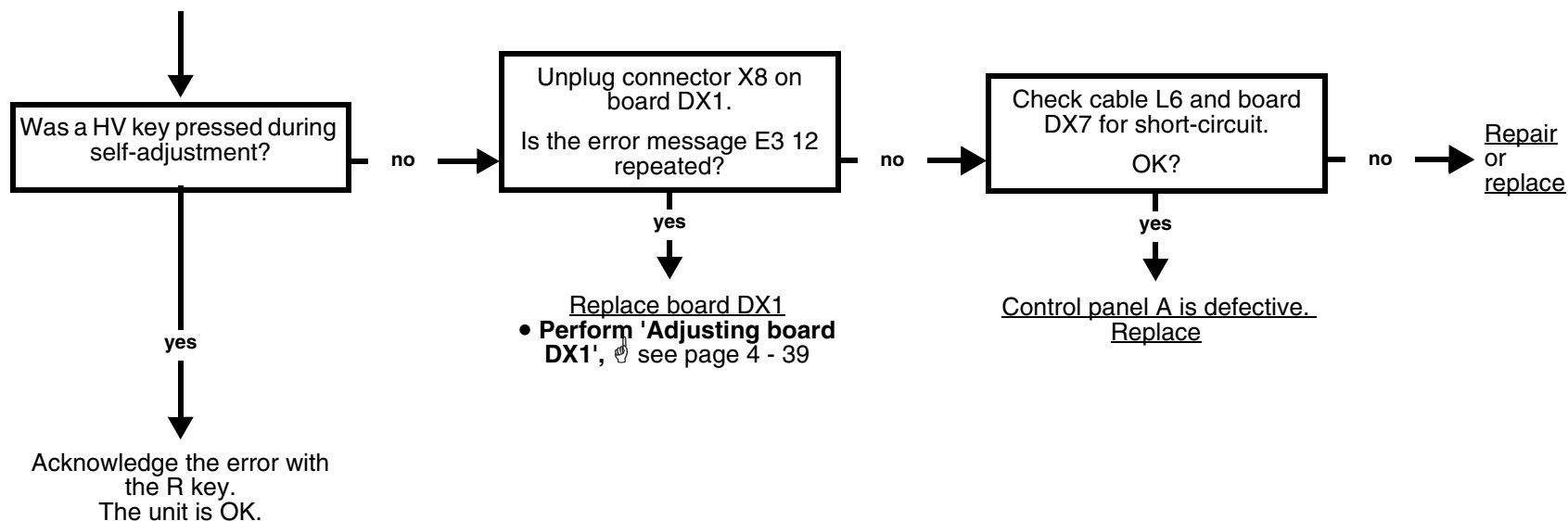
\* Otherwise there is a risk of a short-circuit to the metal housing

\*\* Change of height adjustment indication means:  
Decimal point on/off,  
Cross bar on/off or  
Altering decimal numbers

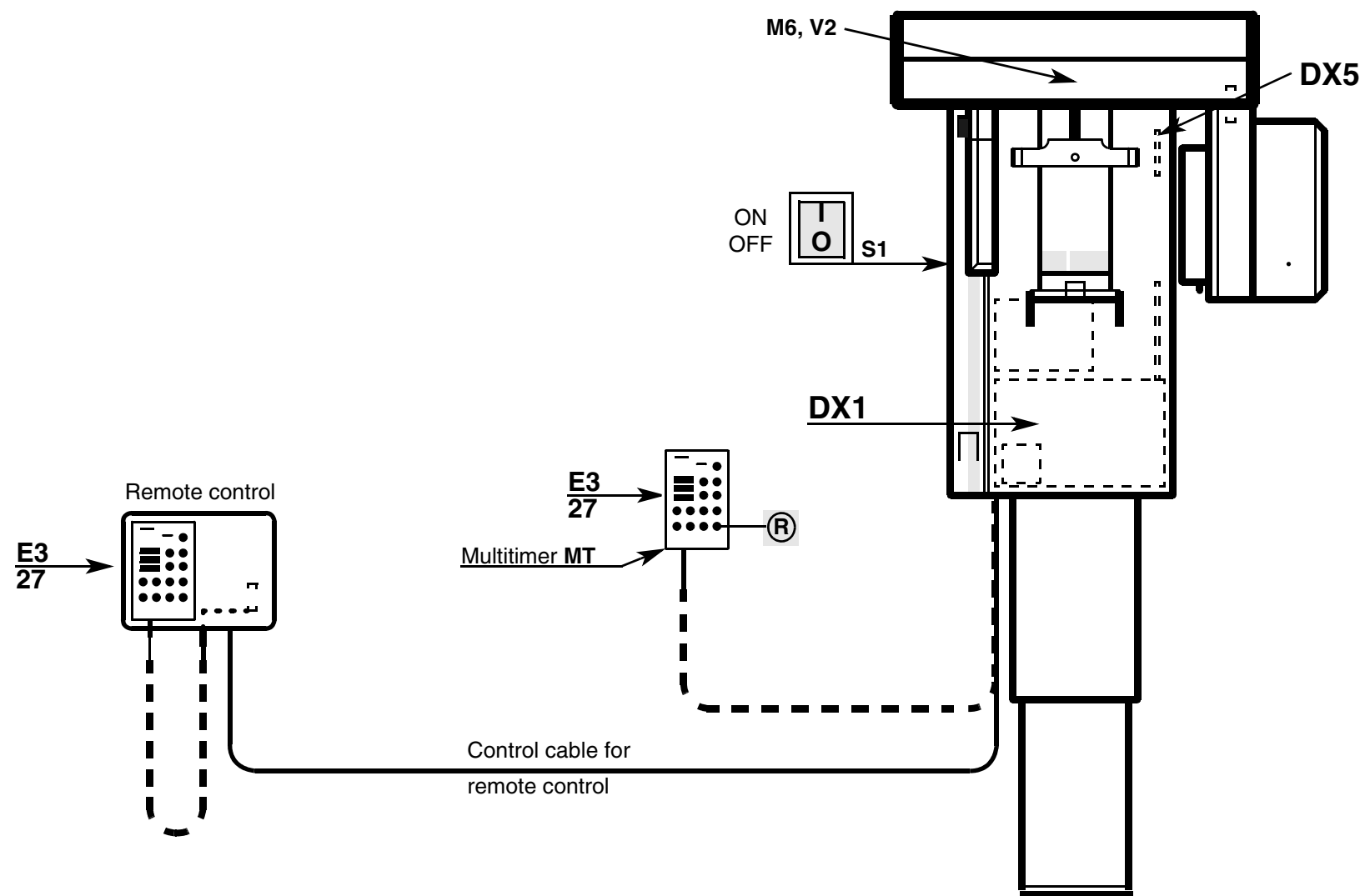




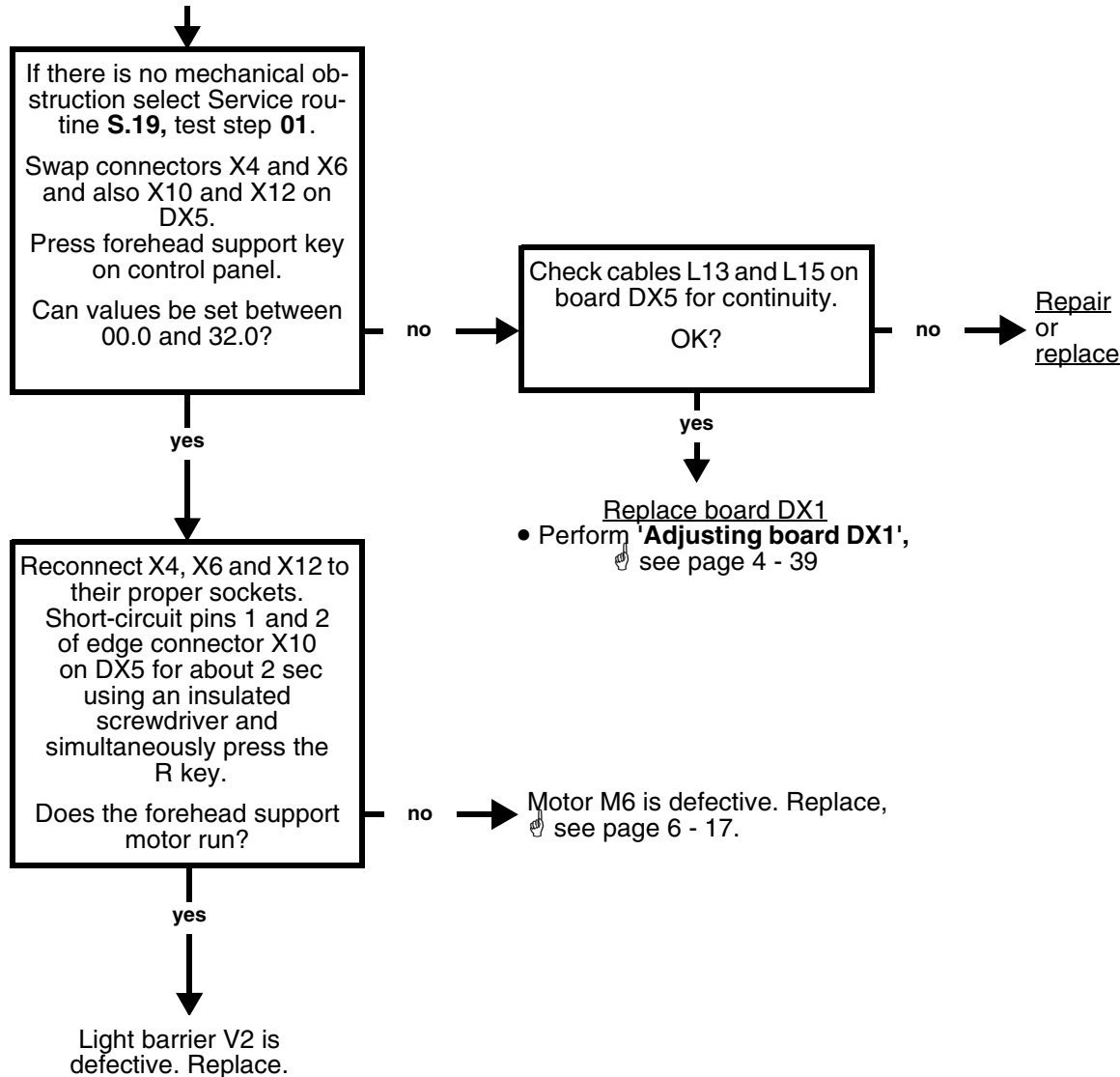
- Height adjustment keys on control panel A must not be pressed during self-adjustment of the unit!



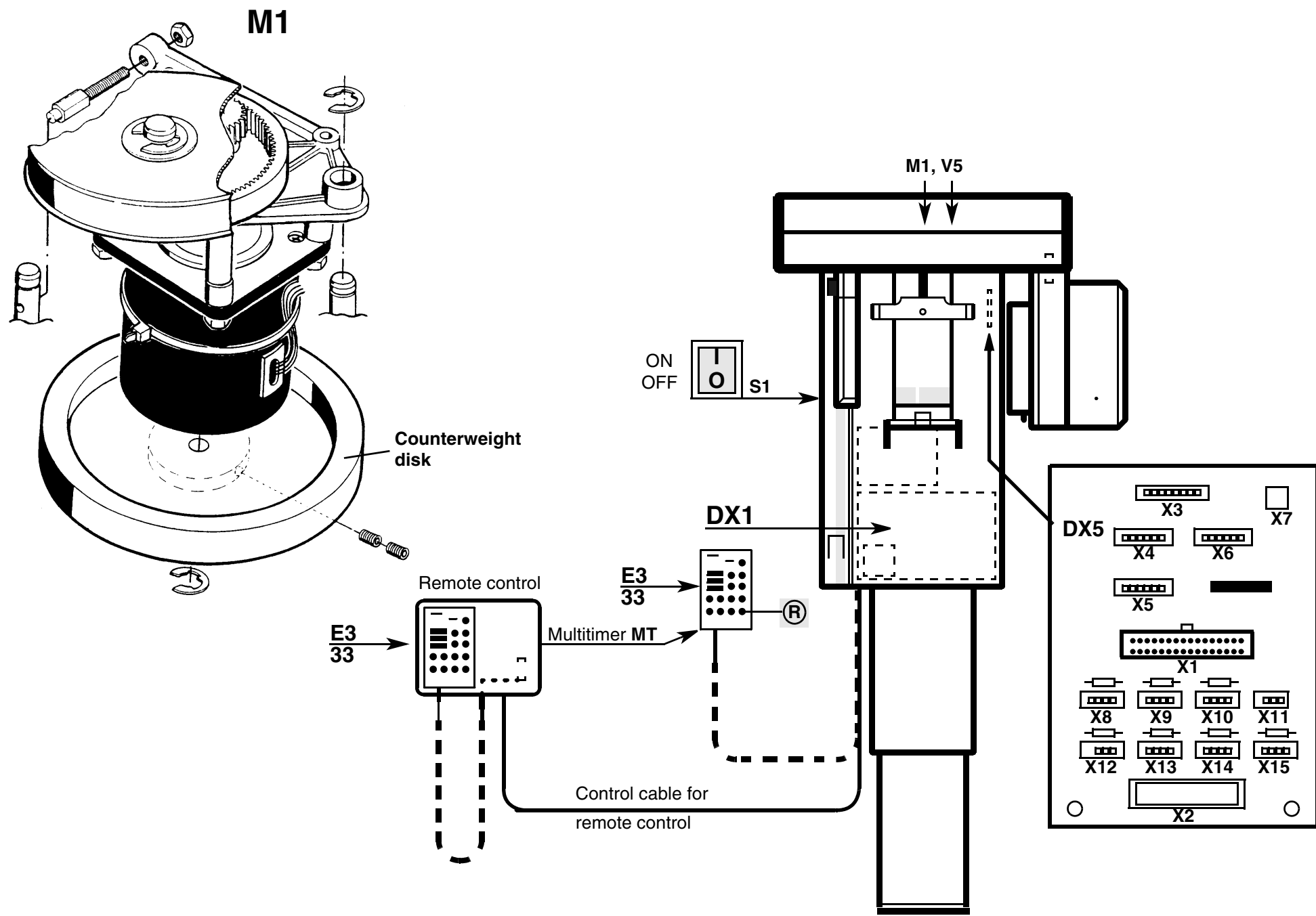
### 3.26 Correcting error of message E3 12: Key for height adjustment pressed during unit self-adjustment.



- Check light barrier V2 for trapped wires or other mechanical obstructions.



### 3.27 Correcting error of messages E3 27, E3 28: Zero point of forehead support was not exited/reached.



- Check rotation ring for possible mechanical faults: move the X-ray tube assy by hand over the entire rotation range. X-ray tube assy must move smoothly without grinding noise
- Possible faults: weight compensation disk on motor M1, rooting of cable L10 in rotation ring, cable ties, covers.
- Possible electrical faults: connectors X1, X2, X3 and X14 on DX5 and connectors X7 and X11 on DX1 must be properly inserted.

Move the X-ray tube assembly by hand to its end position.  
Press the R key on the Multitimer.

Drive motor jerks, error message E3 33 appears after about 16 sec.

Drive motor does not run, E3 33 appears after about 16 sec.

Move the X-ray tube assembly by hand to its start position. Unplug X14 on DX5. Press the T key on the Multitimer. Motor M1 runs and error message E3 32 appears?

Light barrier V5 defective. Replace.

Are contacts X3.1 - 4 and X1.3 - 6 OK?

no → Repair contact problem

yes

Check cable L13 for continuity. OK?

no → Repair or replace

yes

Check the winding resistors with a multimeter. Is resistance  $5 \Omega \pm 15 \%$ ?

no → Motor M1 defective. Replace, see page 6 - 9

yes

Check connection between winding and motor housing with continuity tester. Does connection exist?

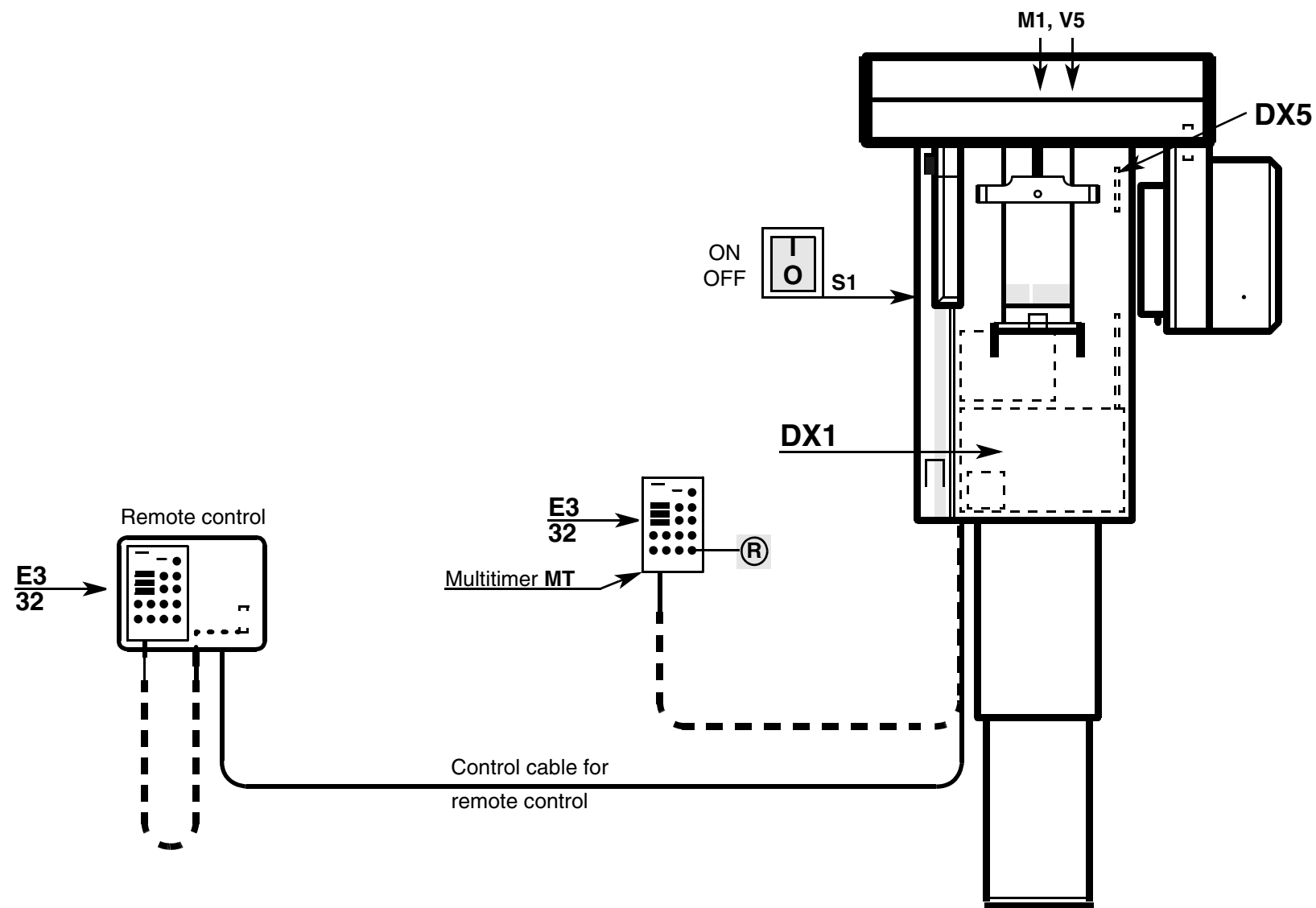
no → Replace board DX1  
• Perform 'Adjusting board DX1', see page 4 - 39

yes

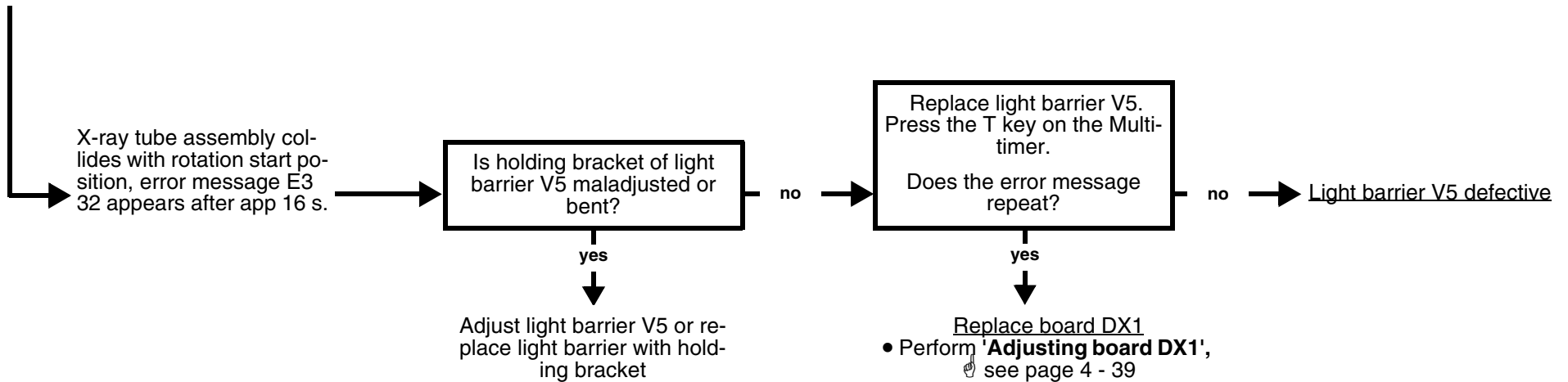
Motor M1 defective. Replace, see page 6 - 9

Continued on next page

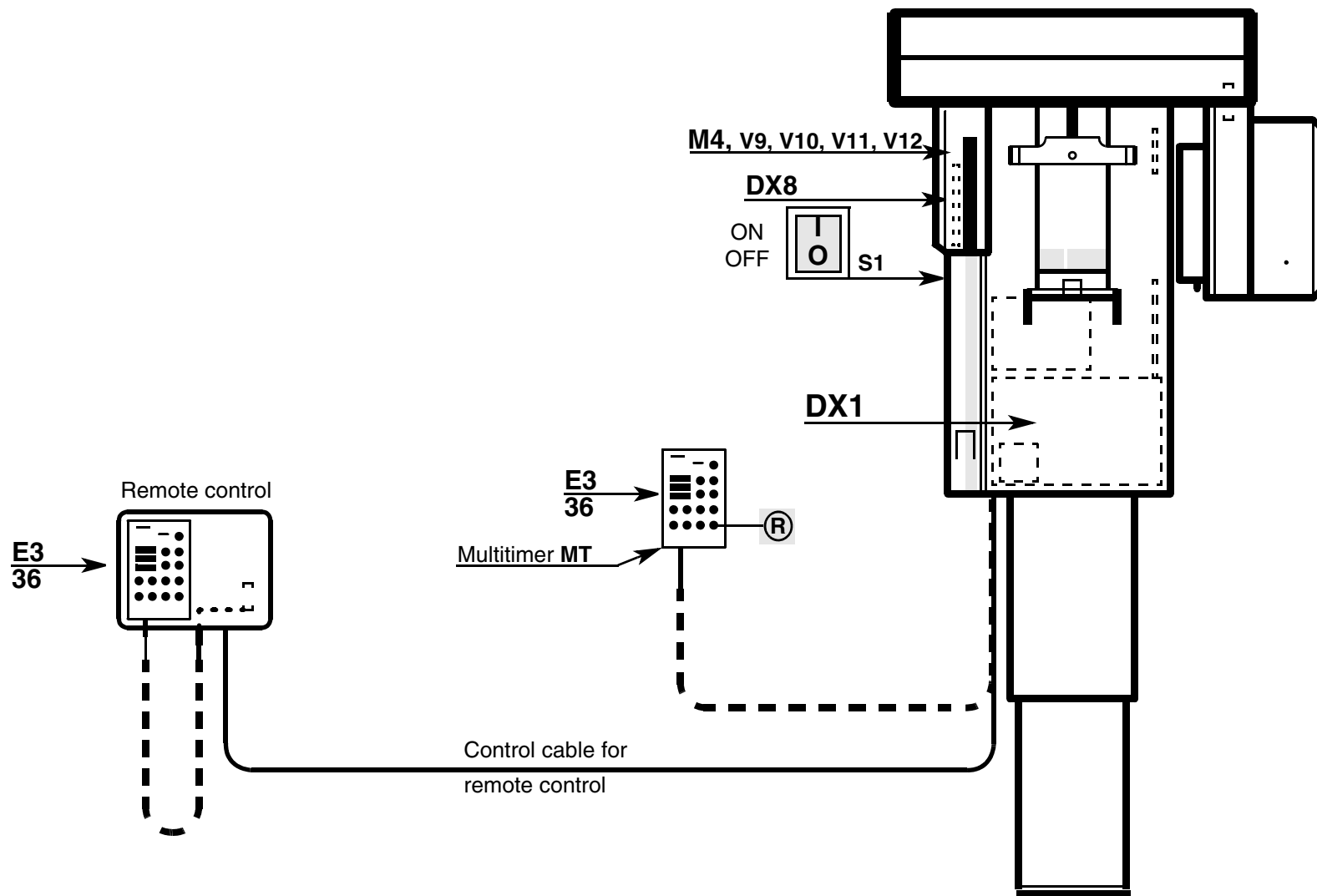
### 3.28 Correcting error of messages E3 32, E3 33: Start position for rotation was not exited/reached.



continued

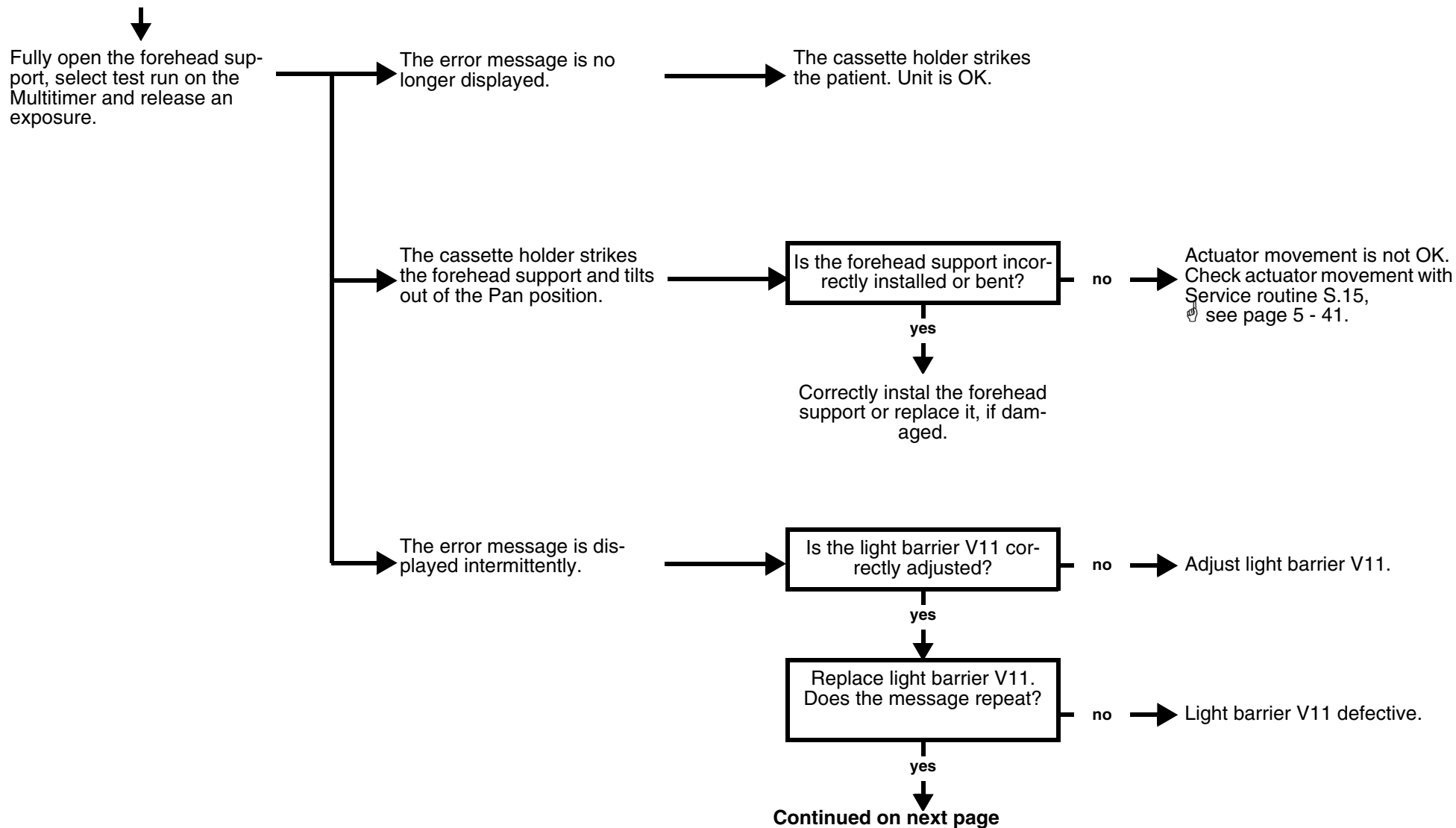


### 3.28 Correcting error of messages E3 32, E3 33: Start position for rotation was not exited/reached.

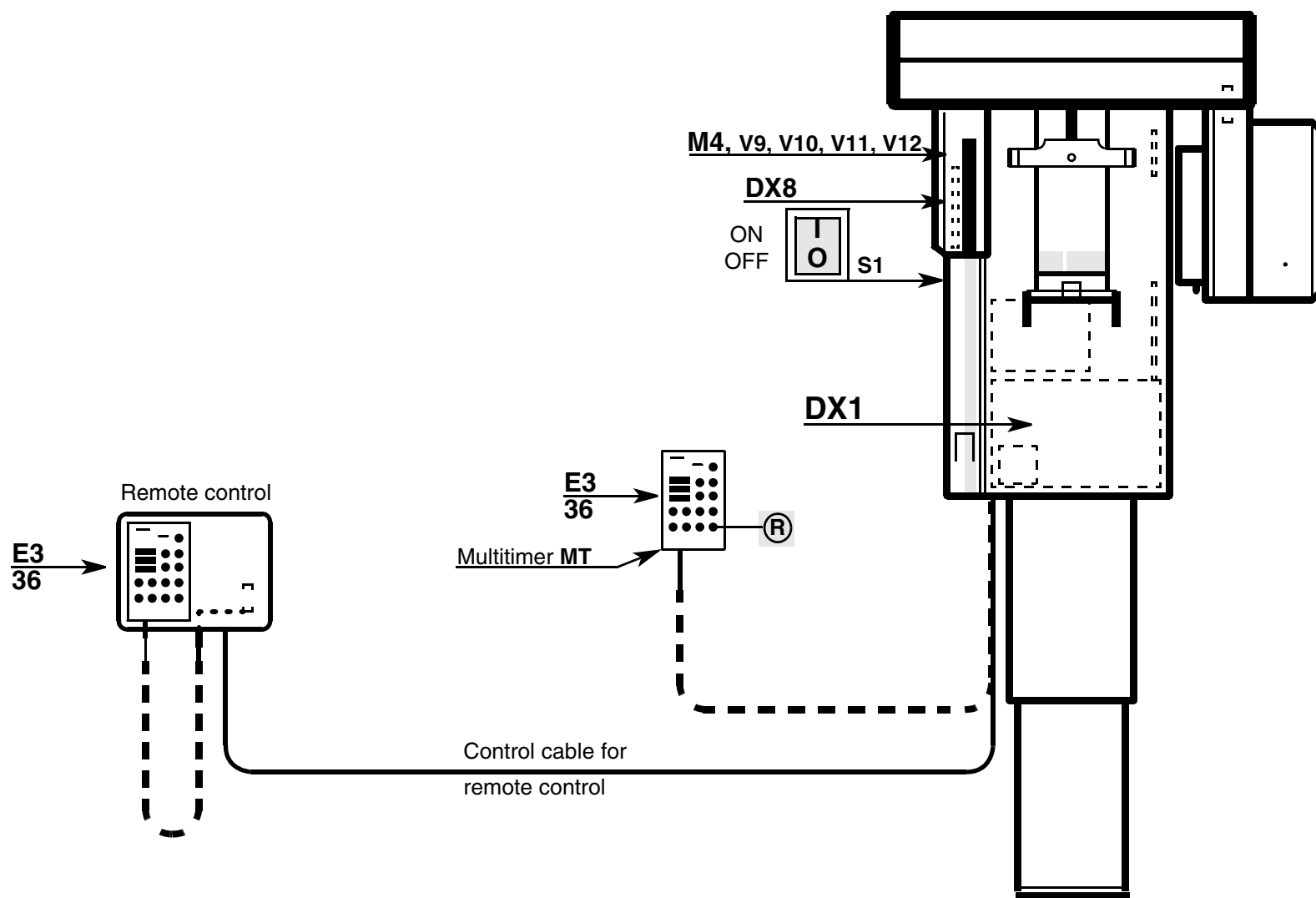
**ORTHOPHOS 5/Plus**



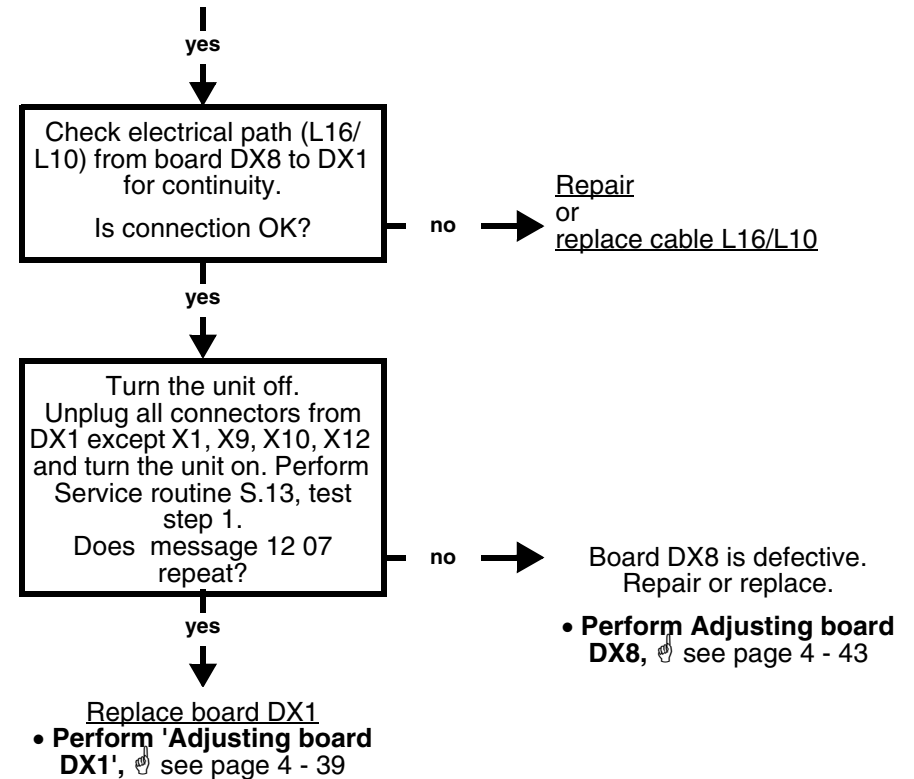
- Body parts or clothing, bandages and the like must not interfere with unit functions.  
Start test run with the T key. During the movement the cassette holder must not come into contact with the patient.



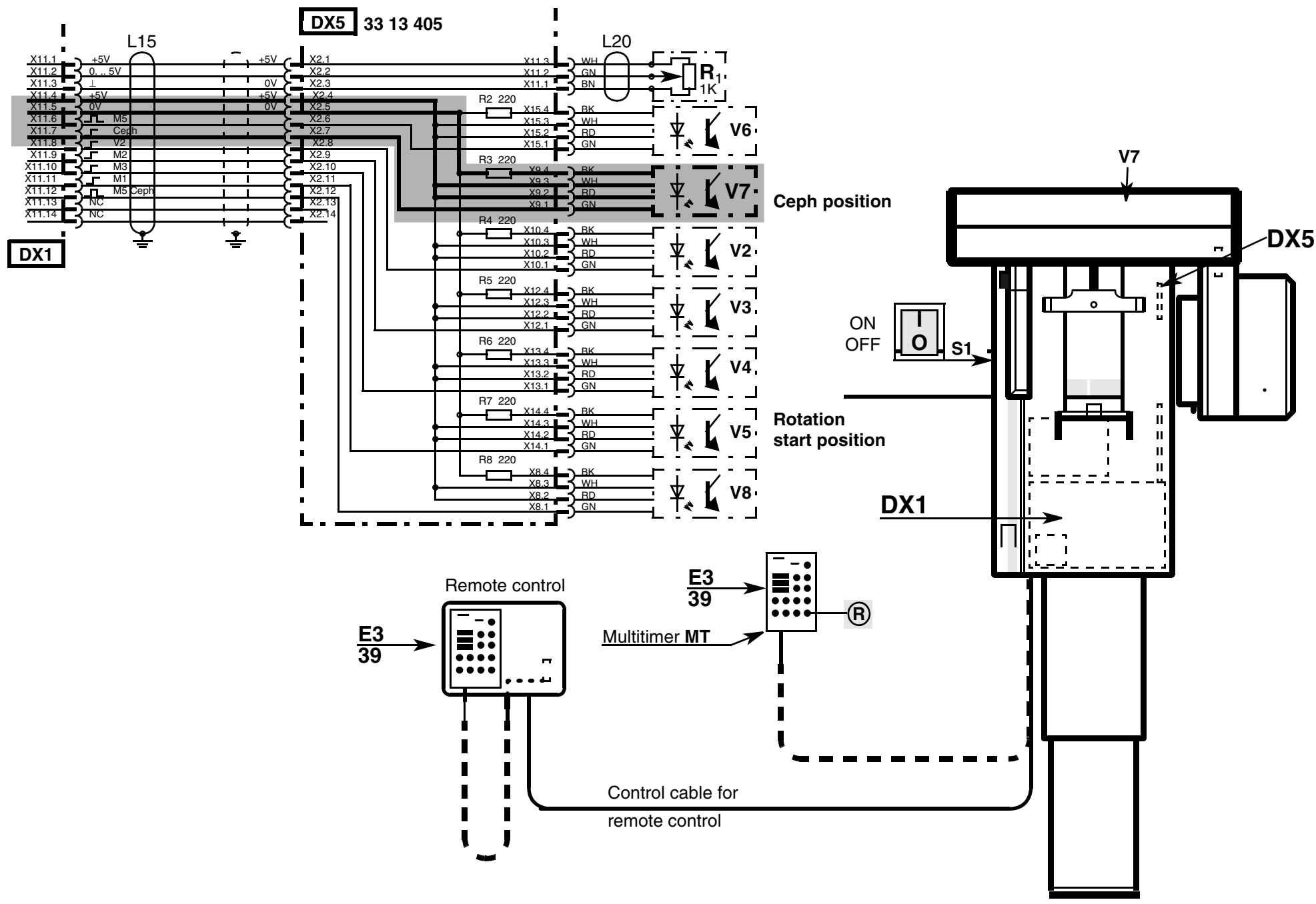
### 3.29 Correcting error of message E3 36: Cassette holder was swivelled from the Pan position during Pan exposure.



continued



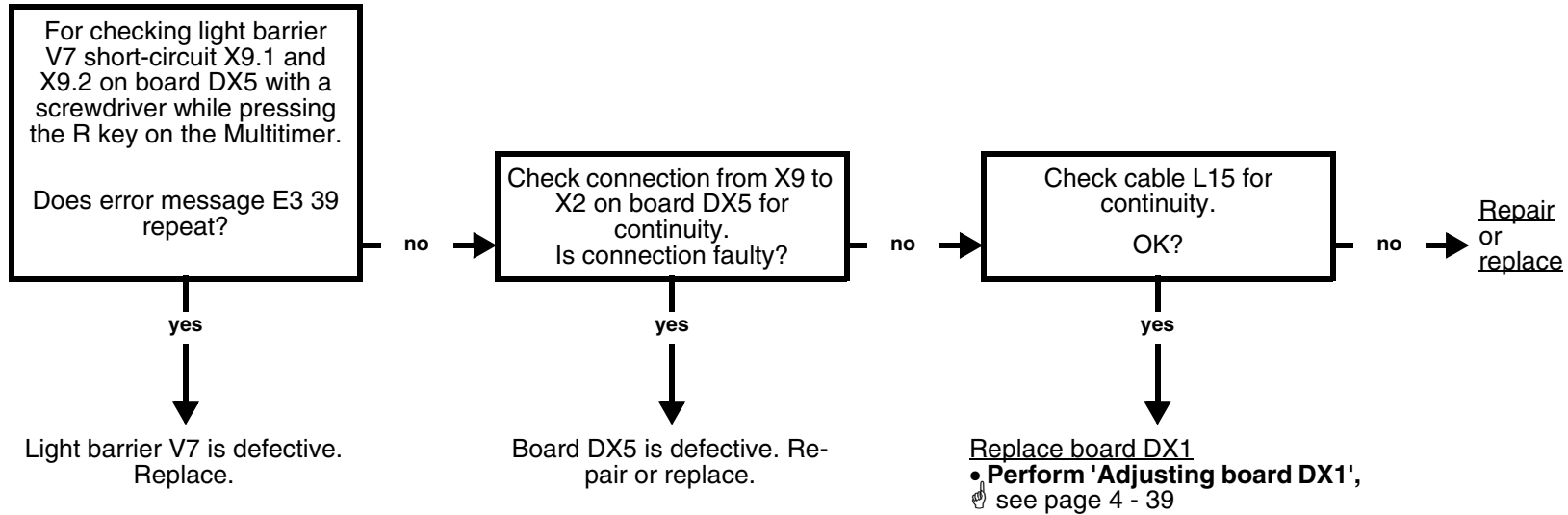
### 3.29 Correcting error of message E3 36: Cassette holder was swivelled from the Pan position during Pan exposure.



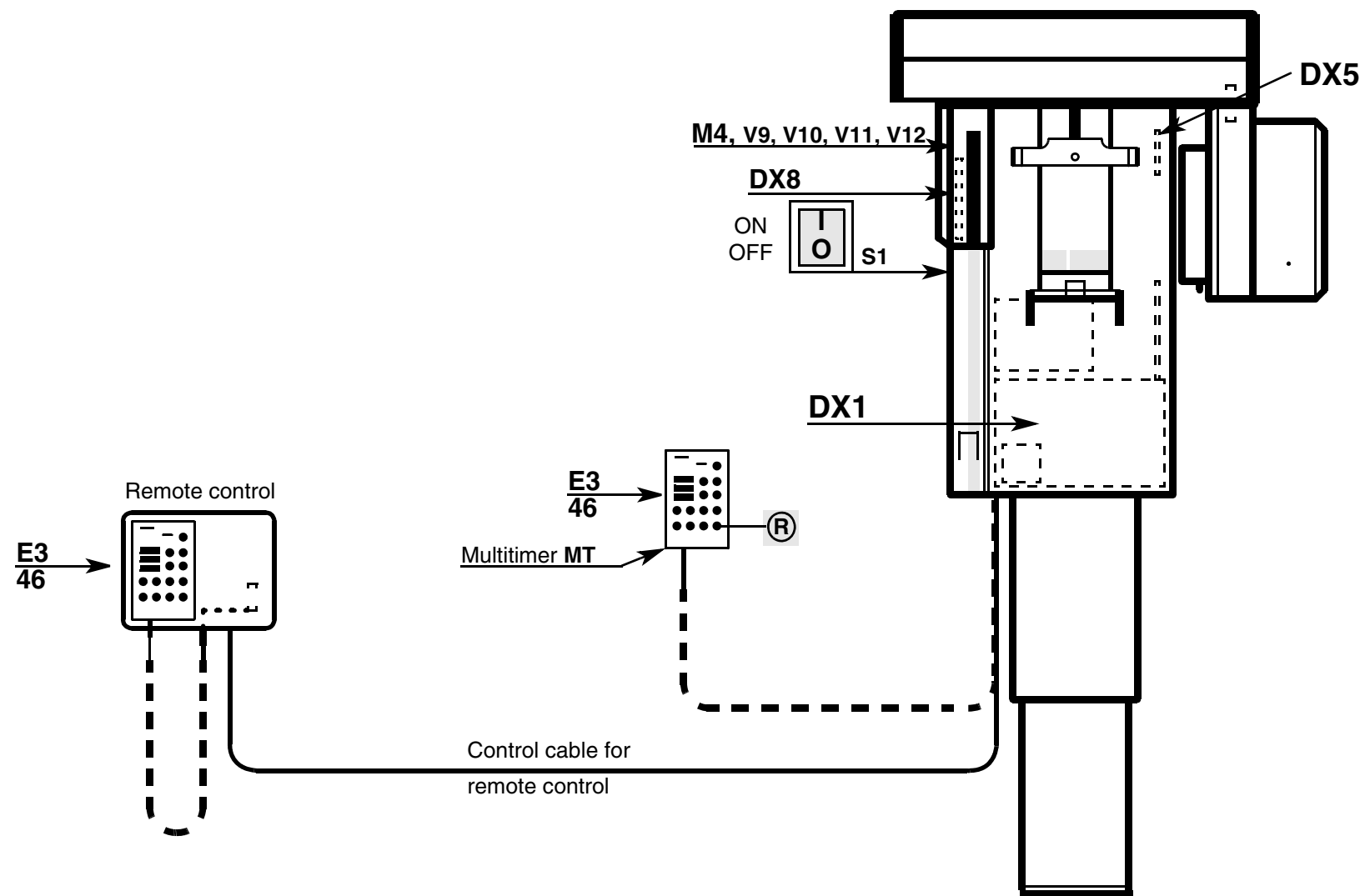
**CAUTION: Always switch the unit OFF before connecting a measuring instrument or replacing any components!**

54 53 571 D 3297  
D 3297.077.01.10.02 04.2007

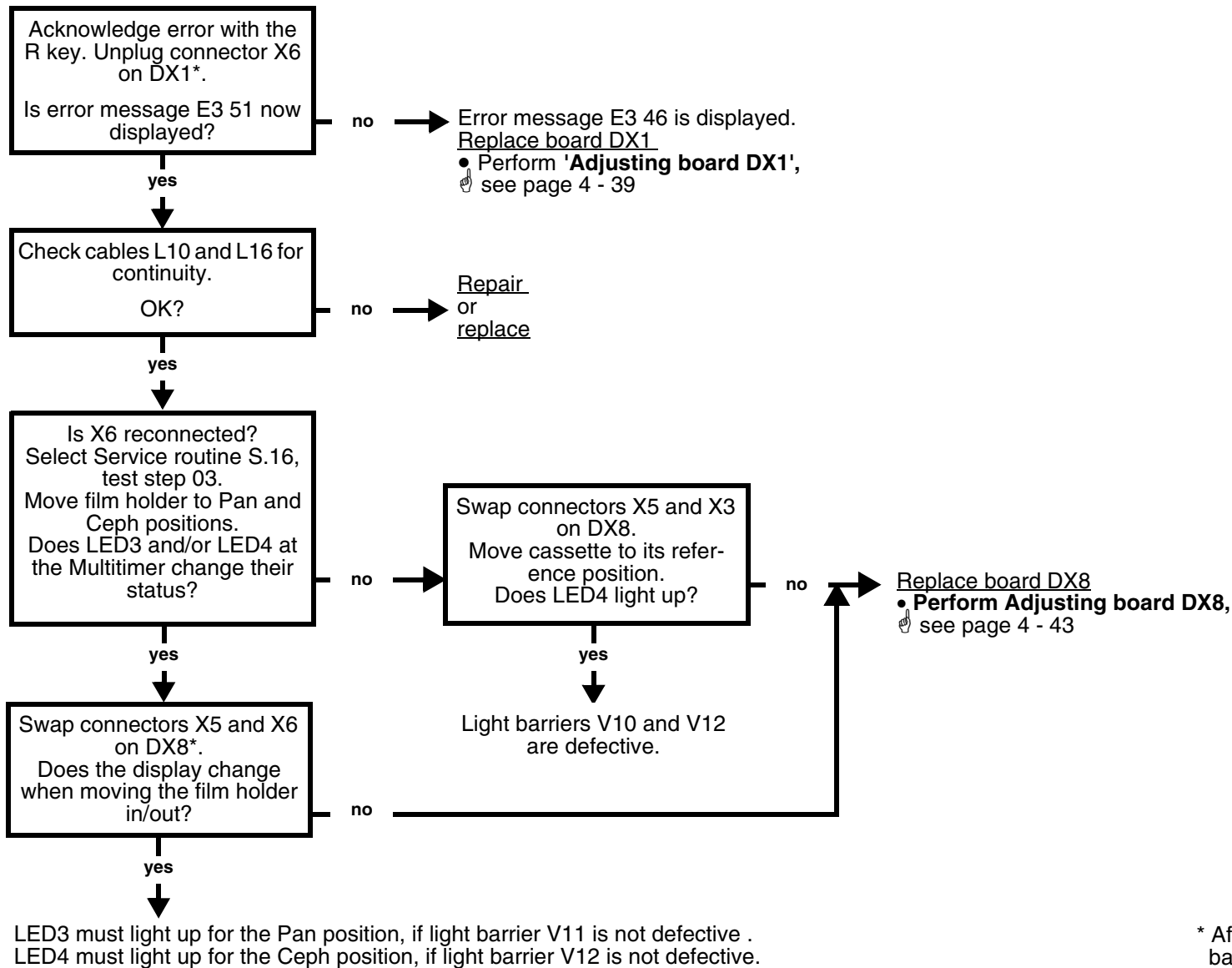
- Are connectors X9 and X2 on DX5 and X11 on DX1 correctly inserted?  
Check V5, make functional test according to Service routine S.14.



### 3.30 Correcting error of message E3 39: Light barrier for Ceph position rotation indicates invalid status

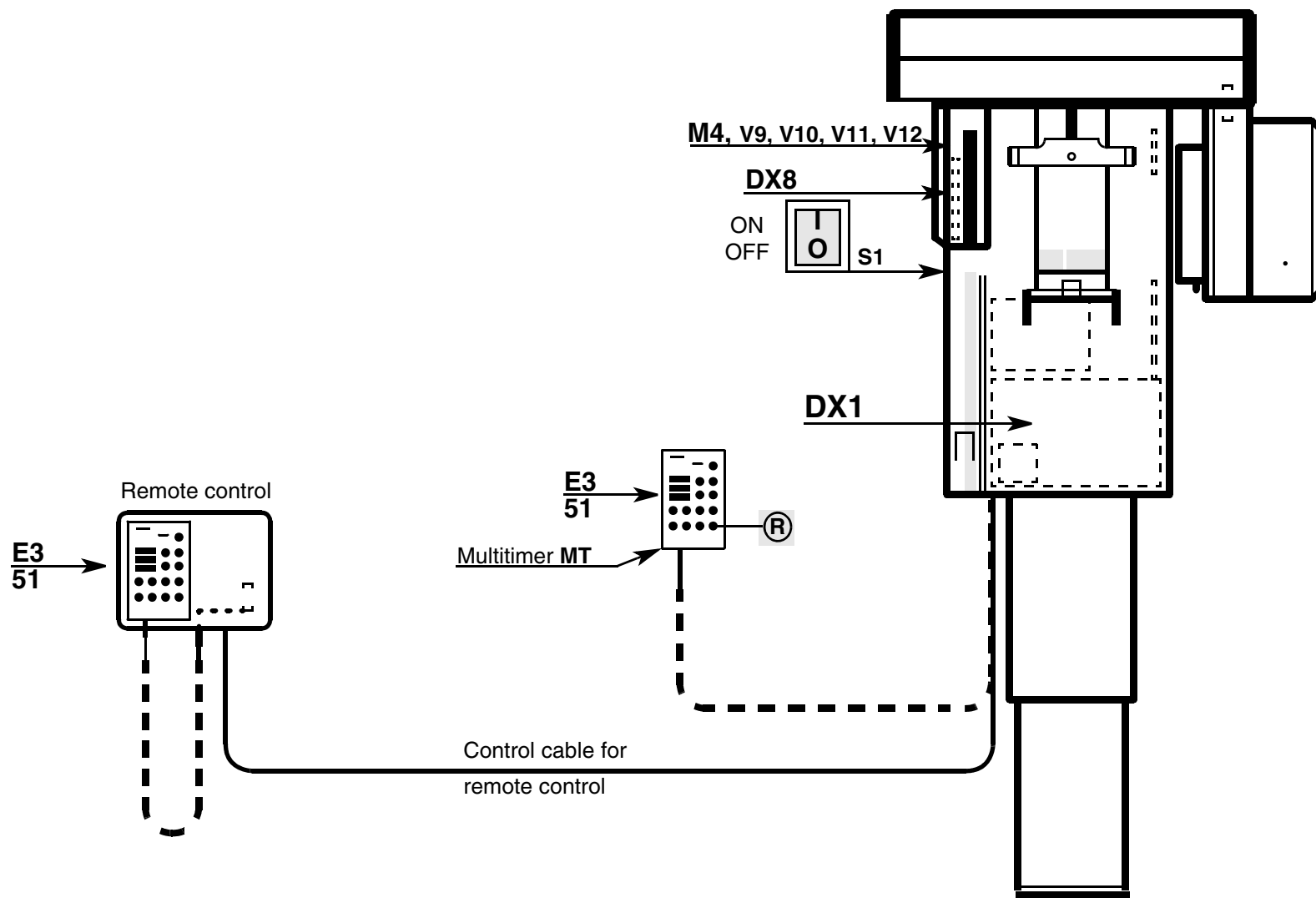


ORTHOPHOS 5/Plus

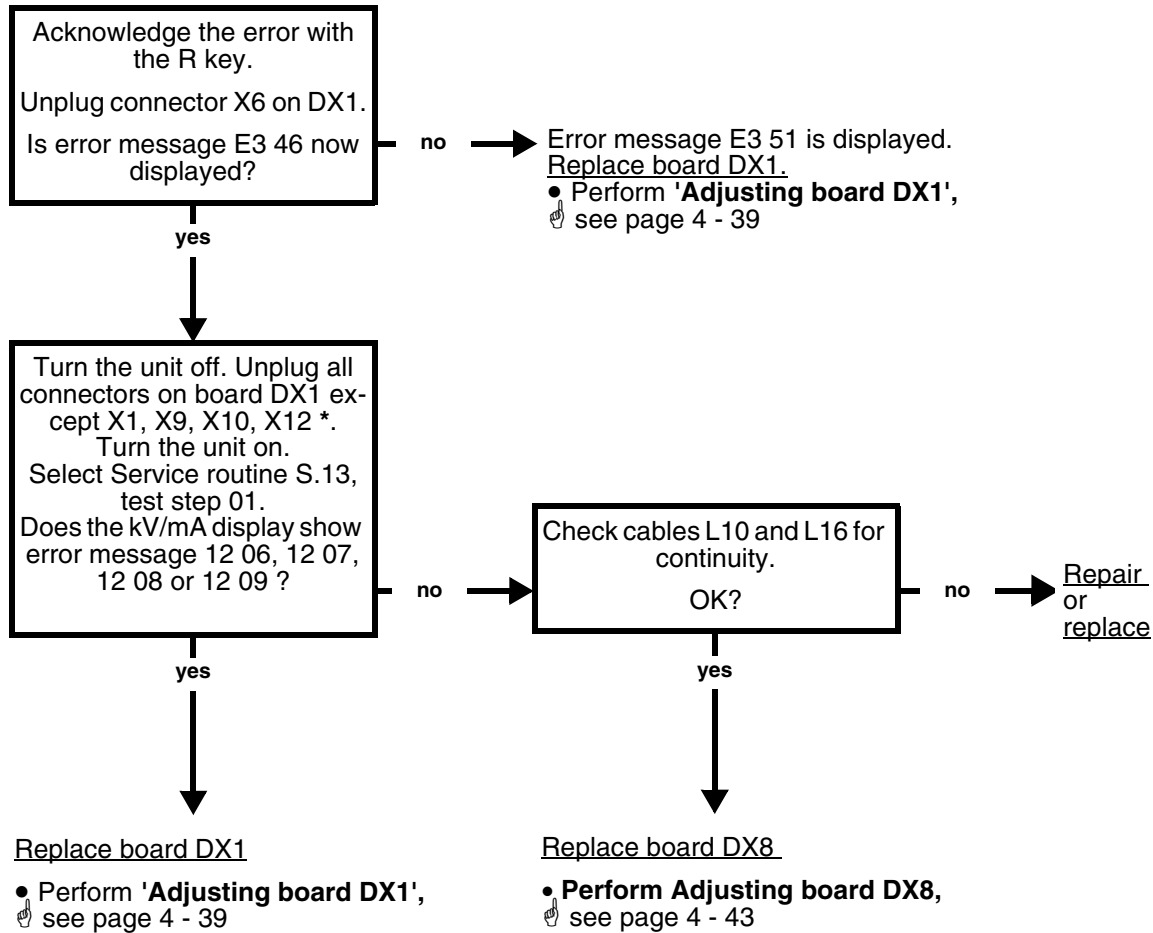


\* After the test put the connector back to its proper position.

### 3.31 Correcting error of message E3 46: Position of cassette holder cannot be determined.

**ORTHOPHOS 5/Plus**

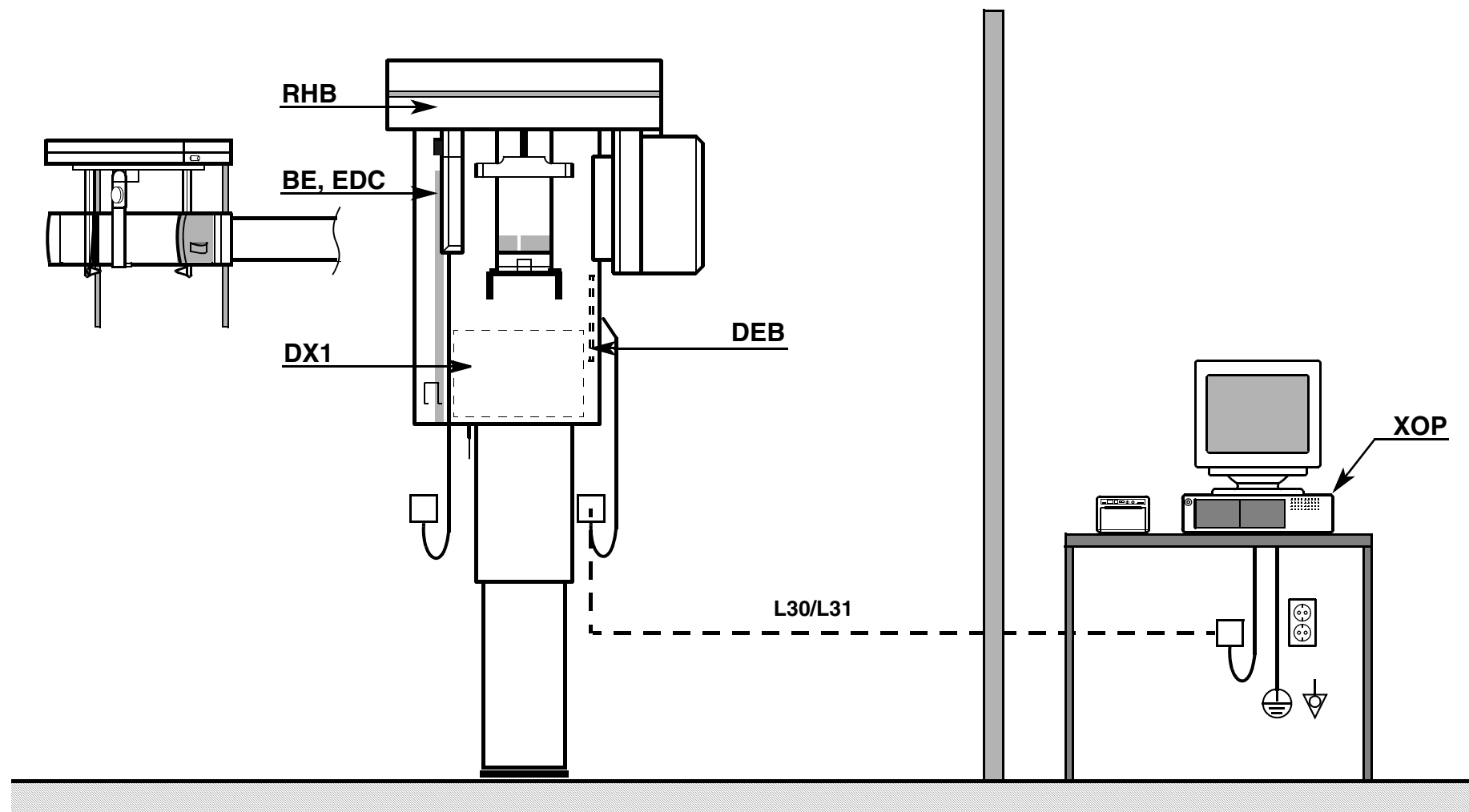


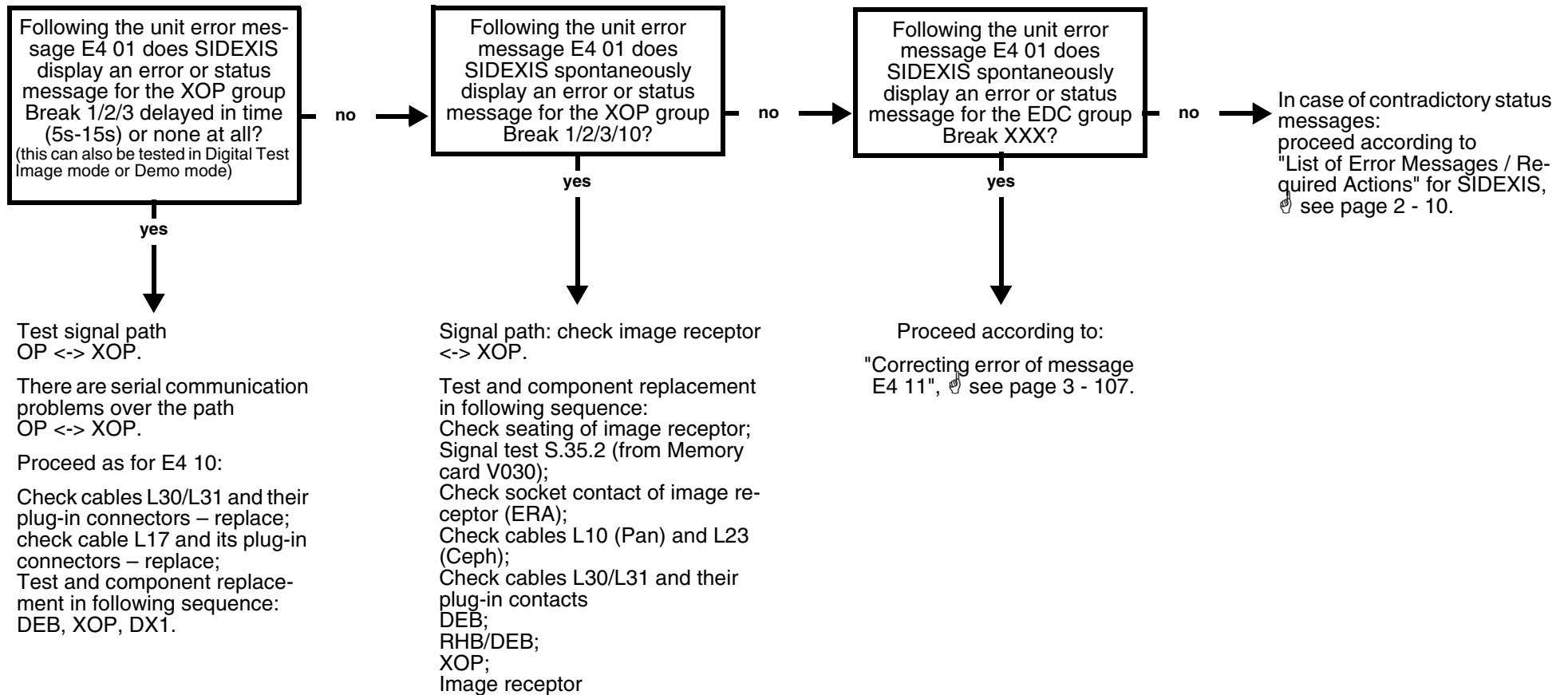


\* After the test put the connectors back to their proper positions.

### 3.32 Correcting error of message E3 51: Faulty signals output by the film drive control.

up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph





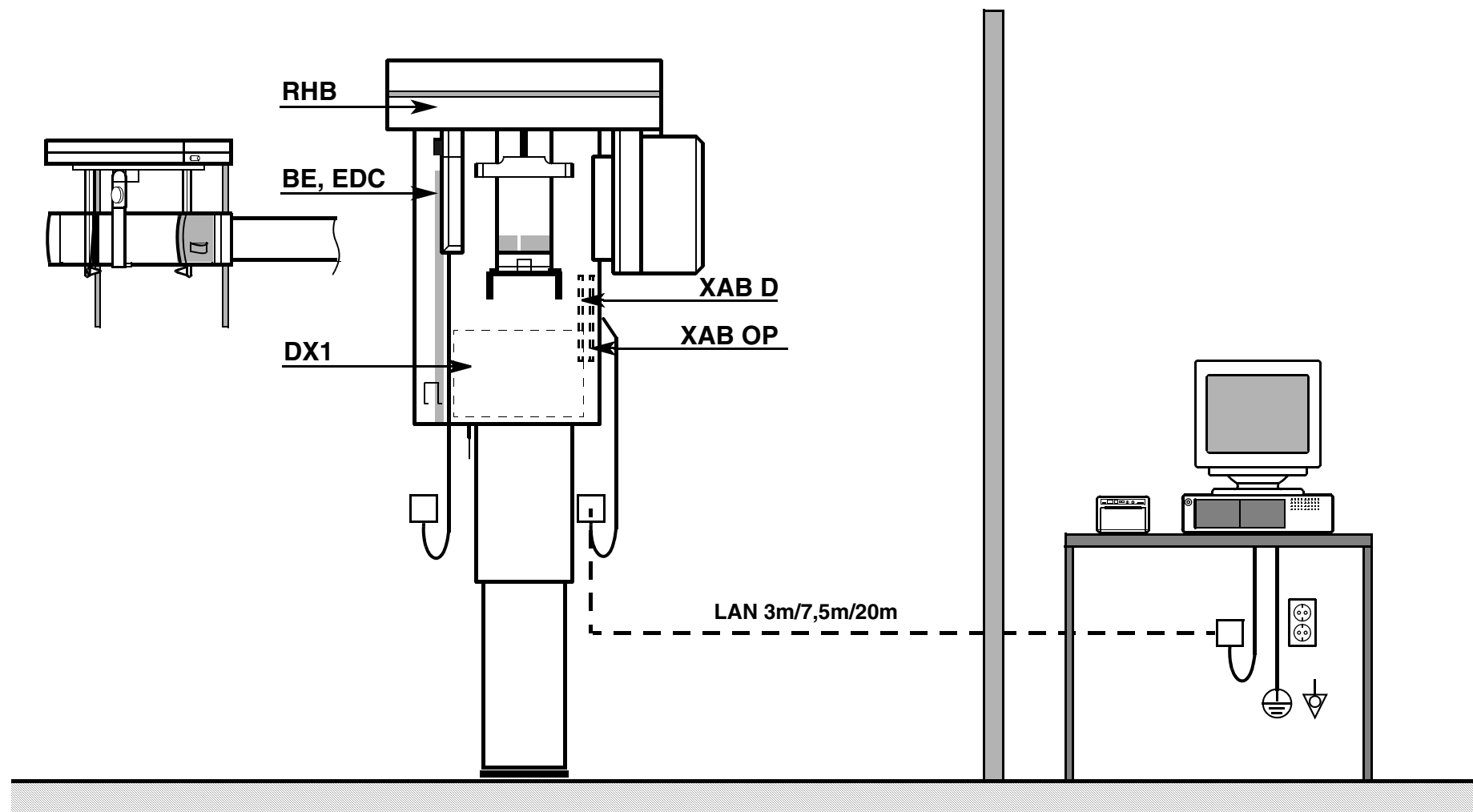
**NOTE**

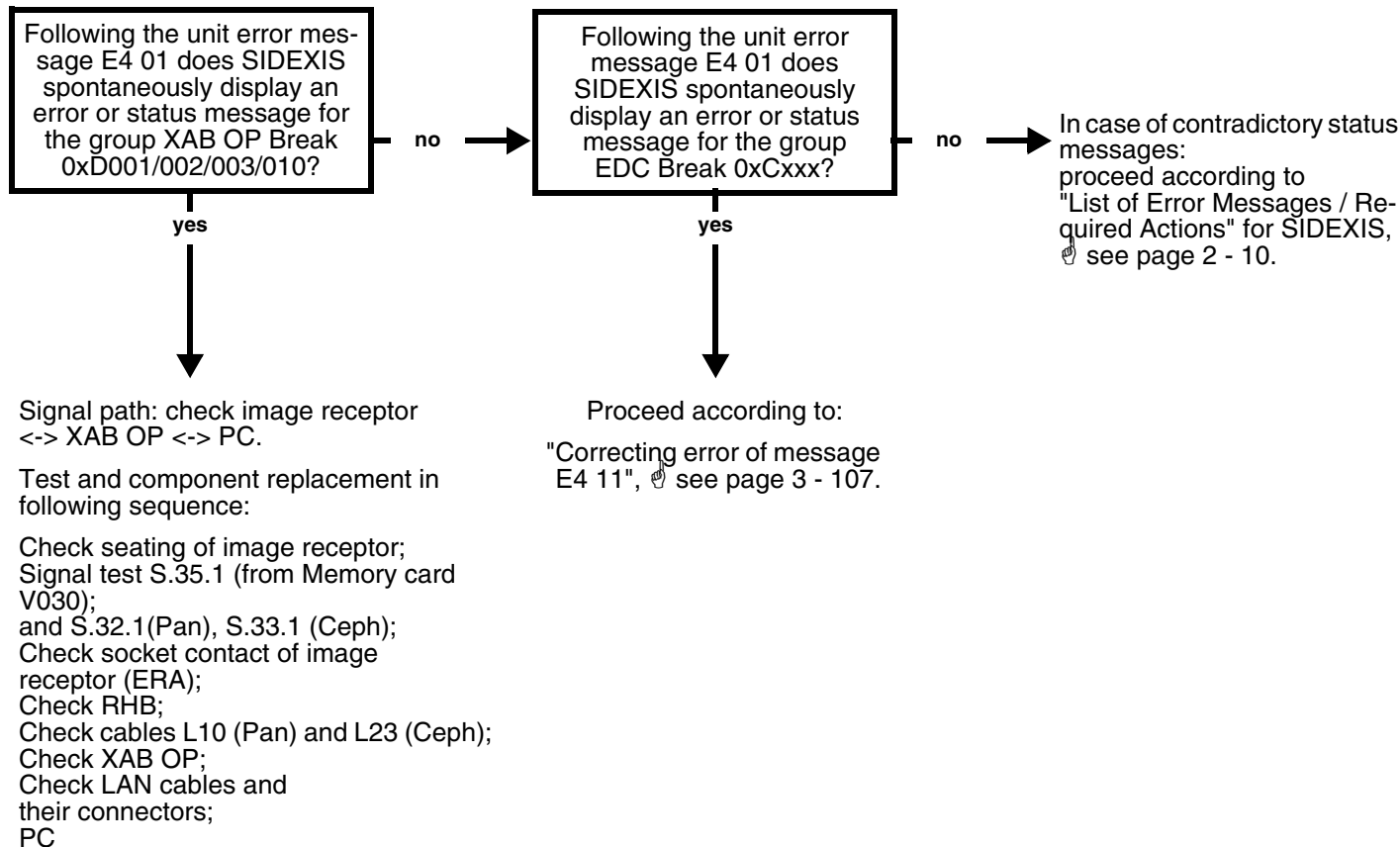
SIDEXIS error message: Displayed in error box, require acknowledging.  
Occur if no image data present.  
(XOP Break, EDC Break etc.)

SIDEXIS status messages: Displayed for limited time in exposure readiness dialog box  
(XOP Break, EDC Break etc.)  
when image data are present.

### 3.33 Correcting error of message E4 01: Exposure aborted by SIDEXIS (with XOP)

from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



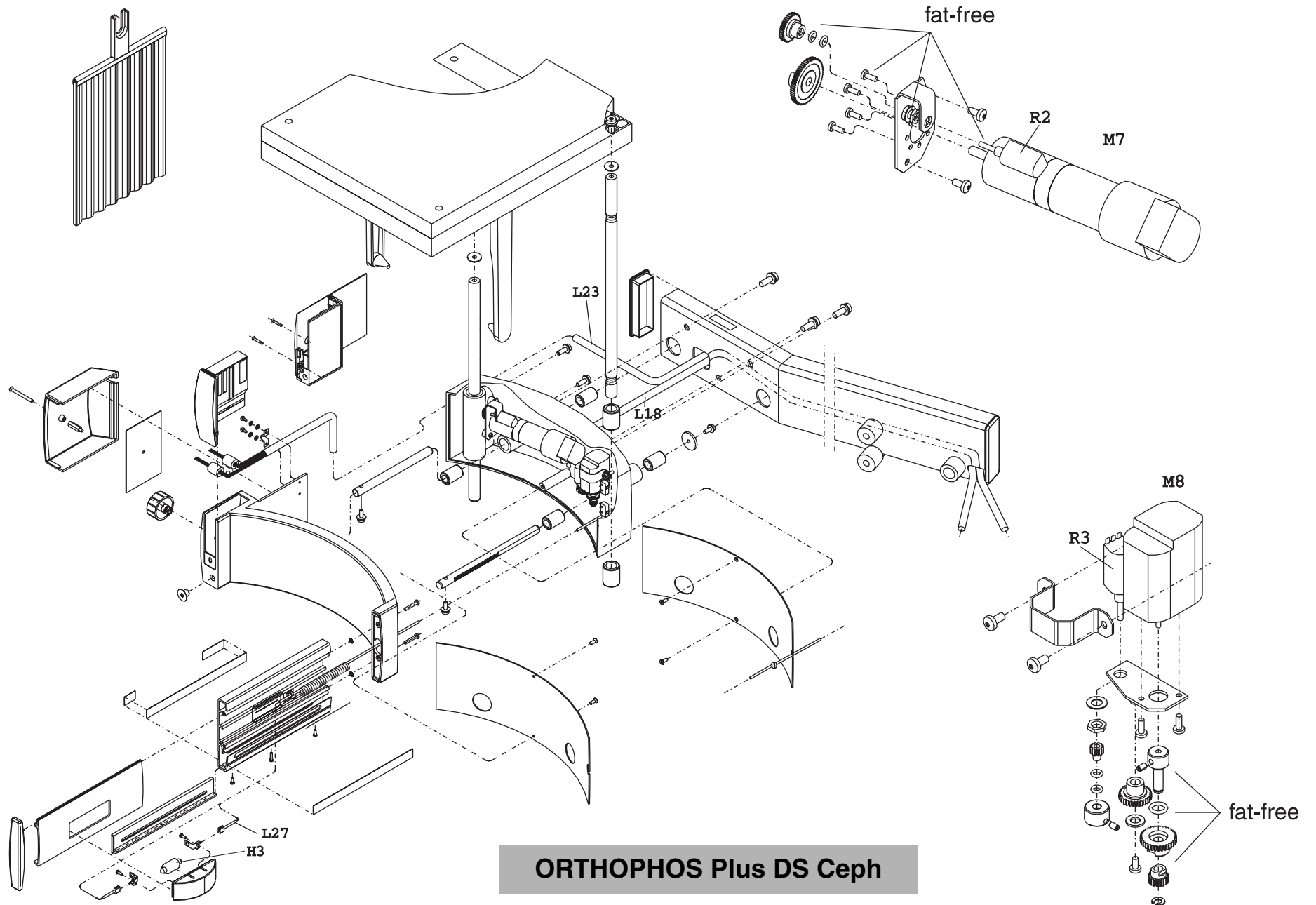


**NOTE**

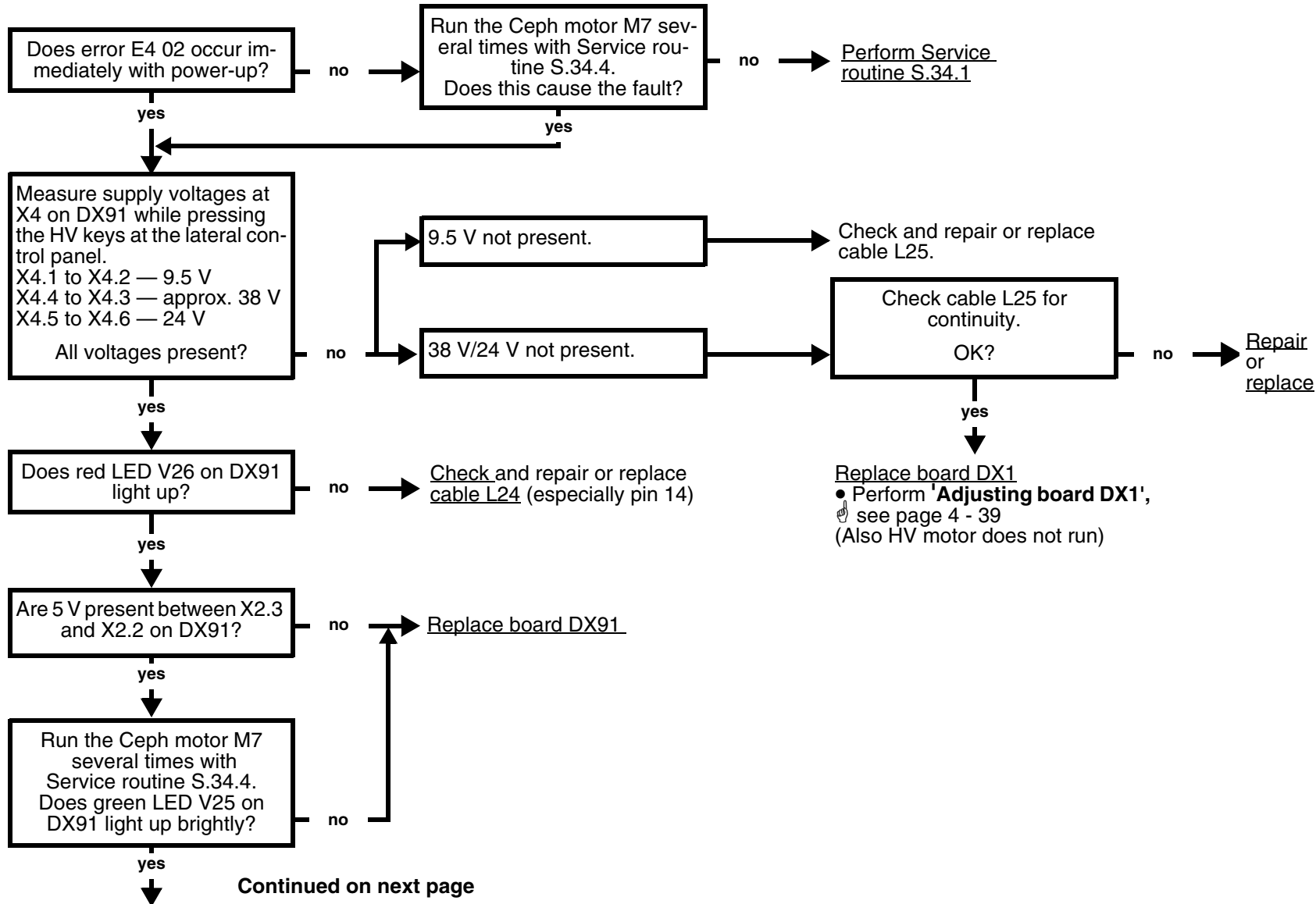
SIDEXIS error message: Displayed in error box, require acknowledging.  
Occur if no image data present.  
(XAB OP Break, EDC Break etc.)

SIDEXIS status messages: Displayed for limited time in exposure readiness dialog box  
(XAB OP Break, EDC Break etc.)  
when image data are present.

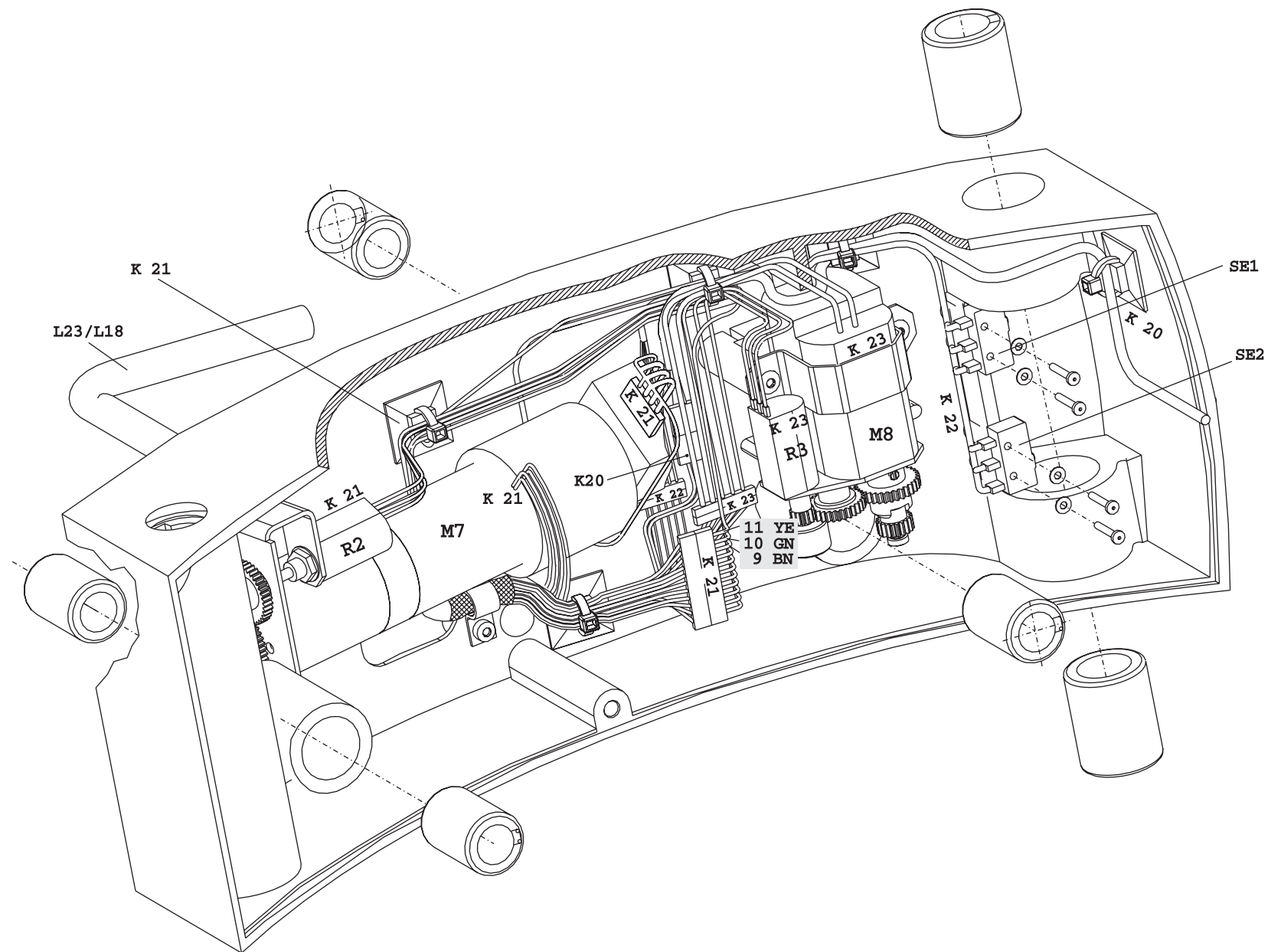
### 3.34 Correcting error of message E4 01: Exposure aborted by SIDEXIS (with XAB)

**ORTHOPHOS Plus DS Ceph**

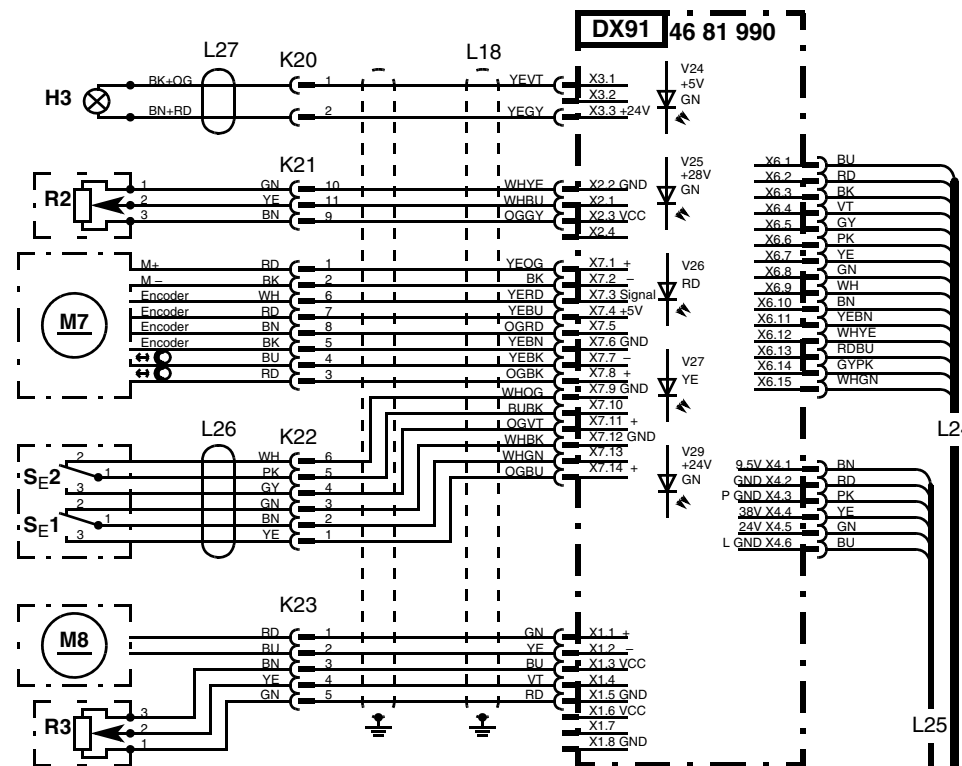
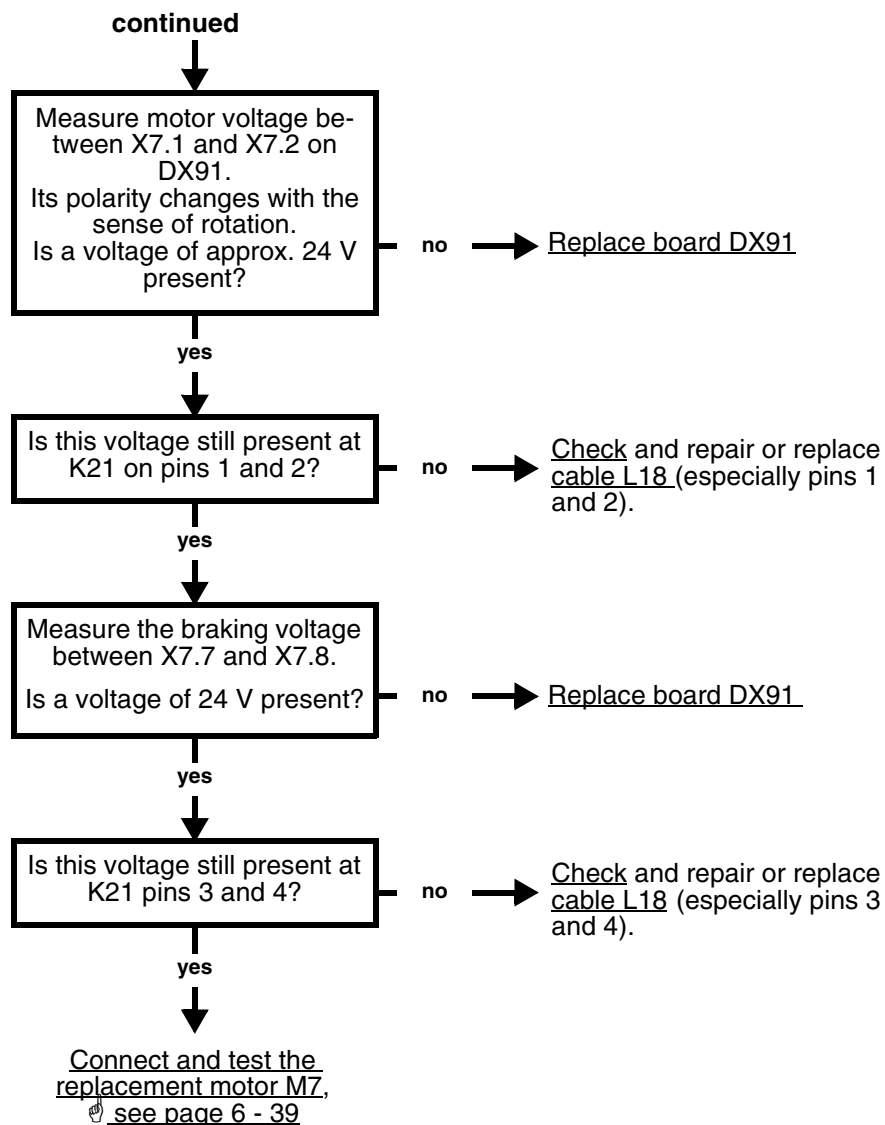
- Is the secondary diaphragm adjusted? Adjust with Service routine S.34, test step 03.



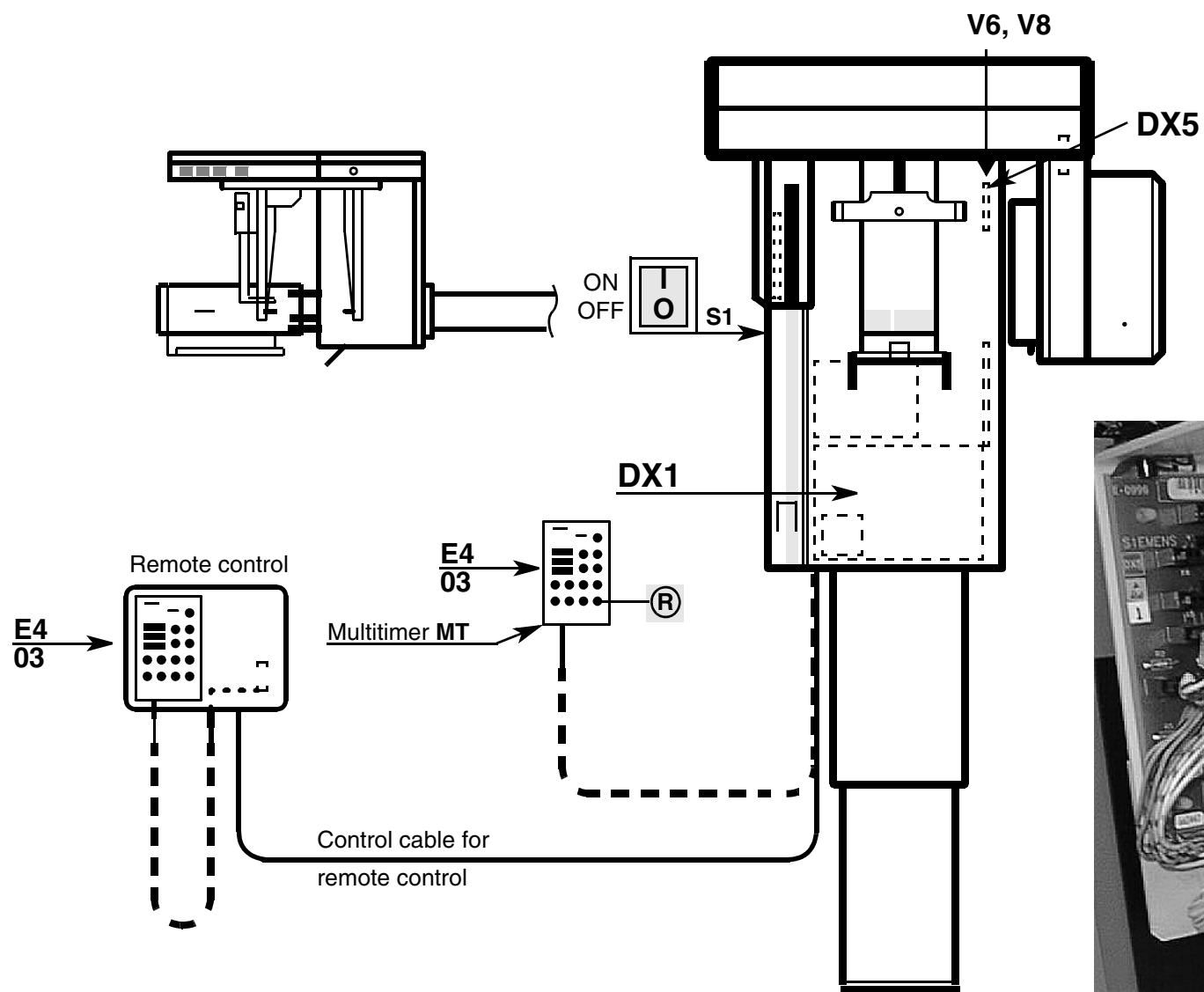
### 3.35 Correcting error of message E4 02: Fault indicated by control unit of Ceph motor.





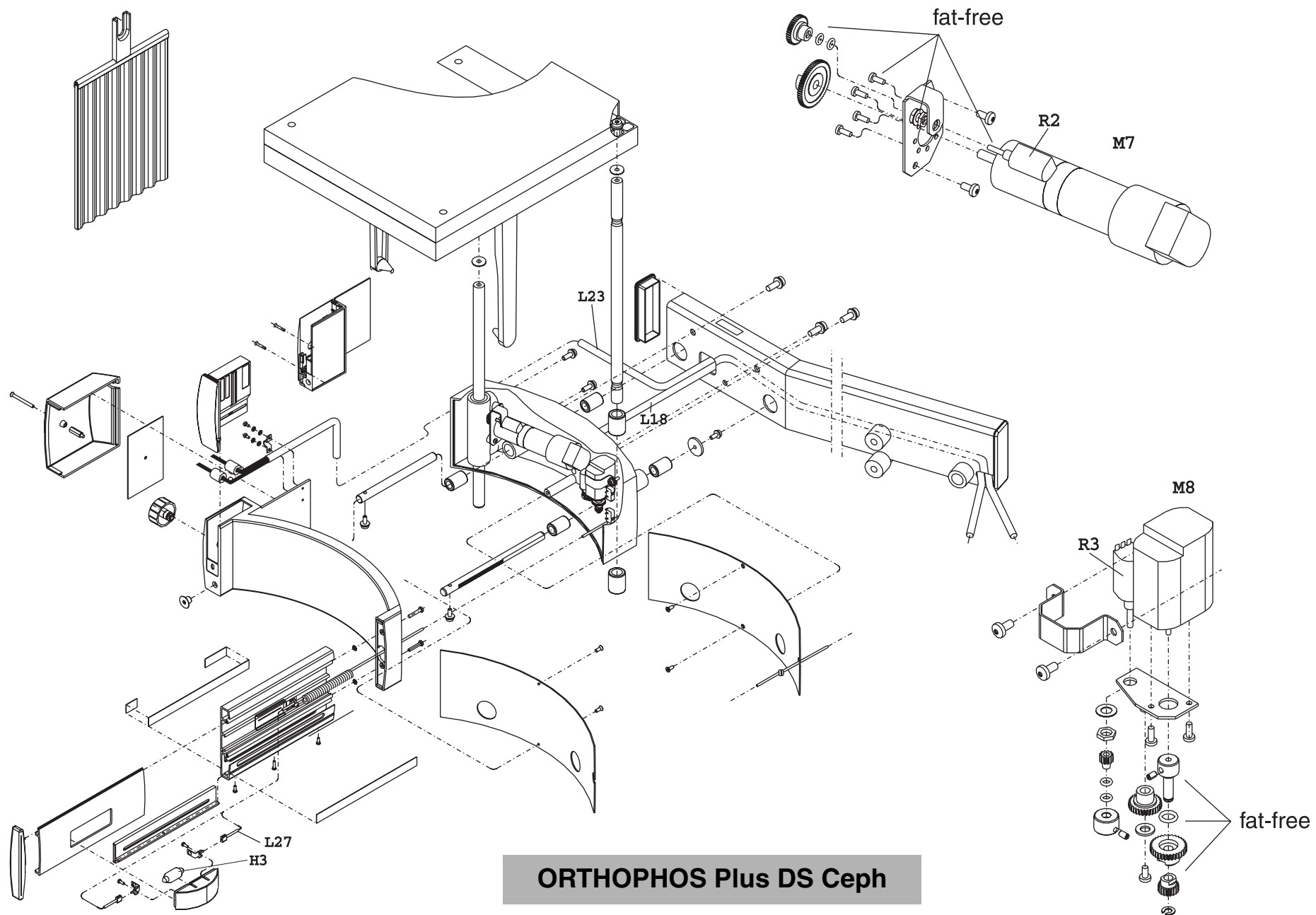


### 3.35 Correcting error of message E4 02: Fault indicated by control unit of Ceph motor.

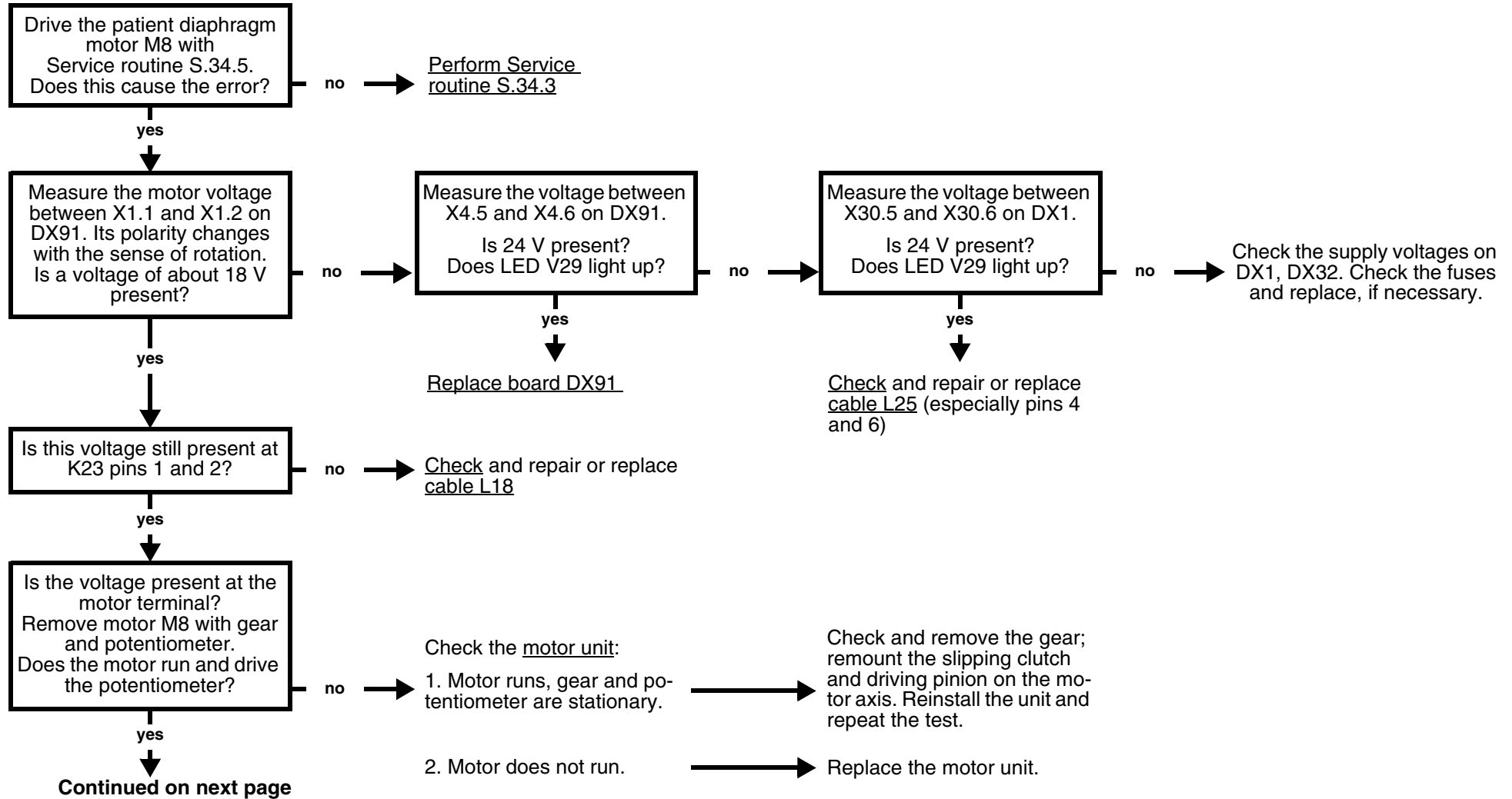
**ORTHOPHOS Plus DS Ceph**

- 
- ```
graph LR; Start(( )) --> Q1{Is error message E4 03 immediately displayed?}; Q1 -- yes --> A1[Light barrier V6 or lead is defective.]; Q1 -- no --> Q2{Is error message E4 03 displayed after about 4 seconds?}; Q2 -- yes --> A2[Broken segments on upper slotted disk.]; Q2 -- no --> Q3{Is error message E3 09 immediately displayed?}; Q3 -- yes --> A3[Light barrier V8 or lead is defective.]; Q3 -- no --> Q4{Is error message E3 09 displayed after about 4 seconds?}; Q4 -- yes --> A4[Broken segments on lower slotted disk.];
```

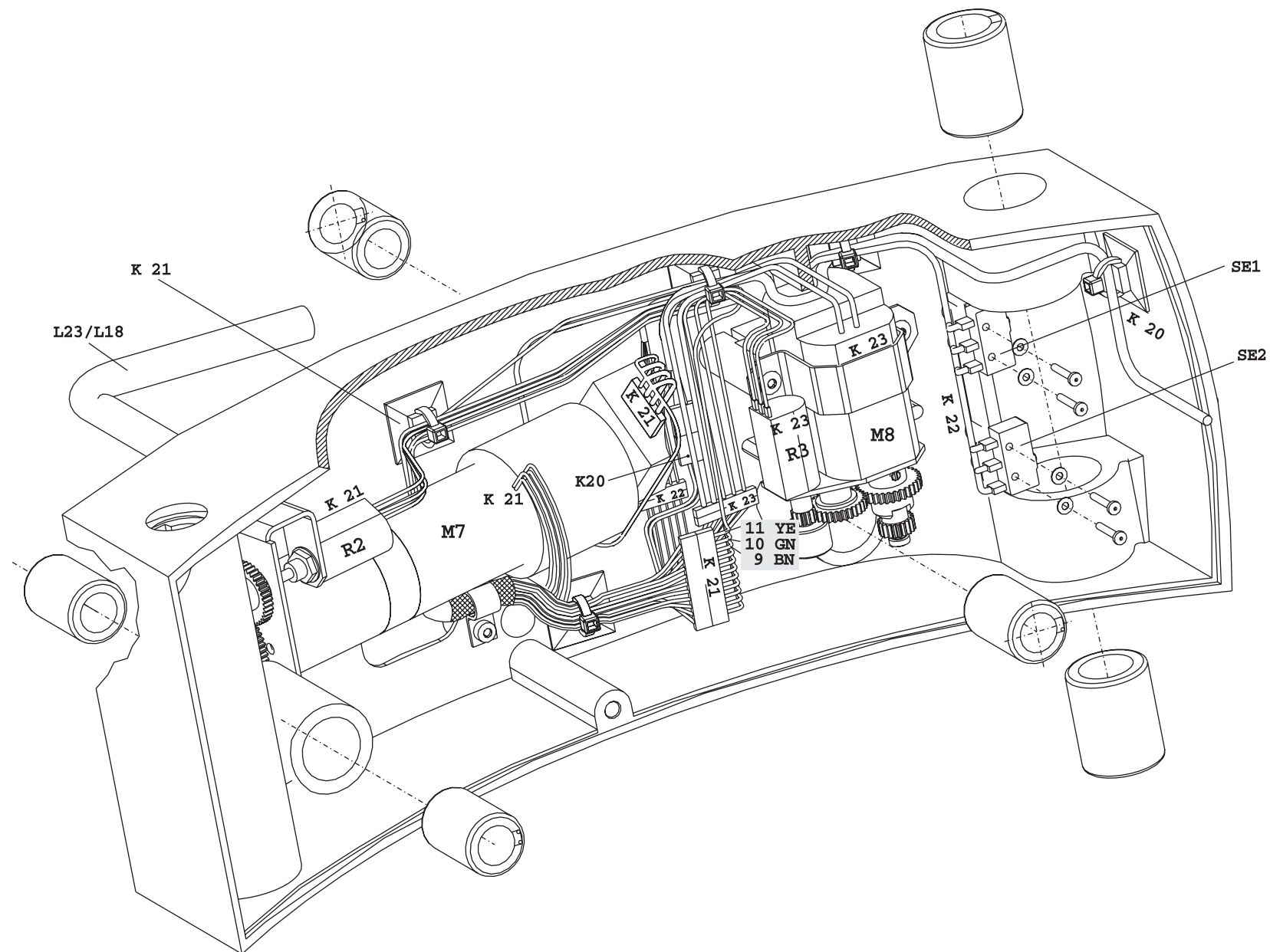


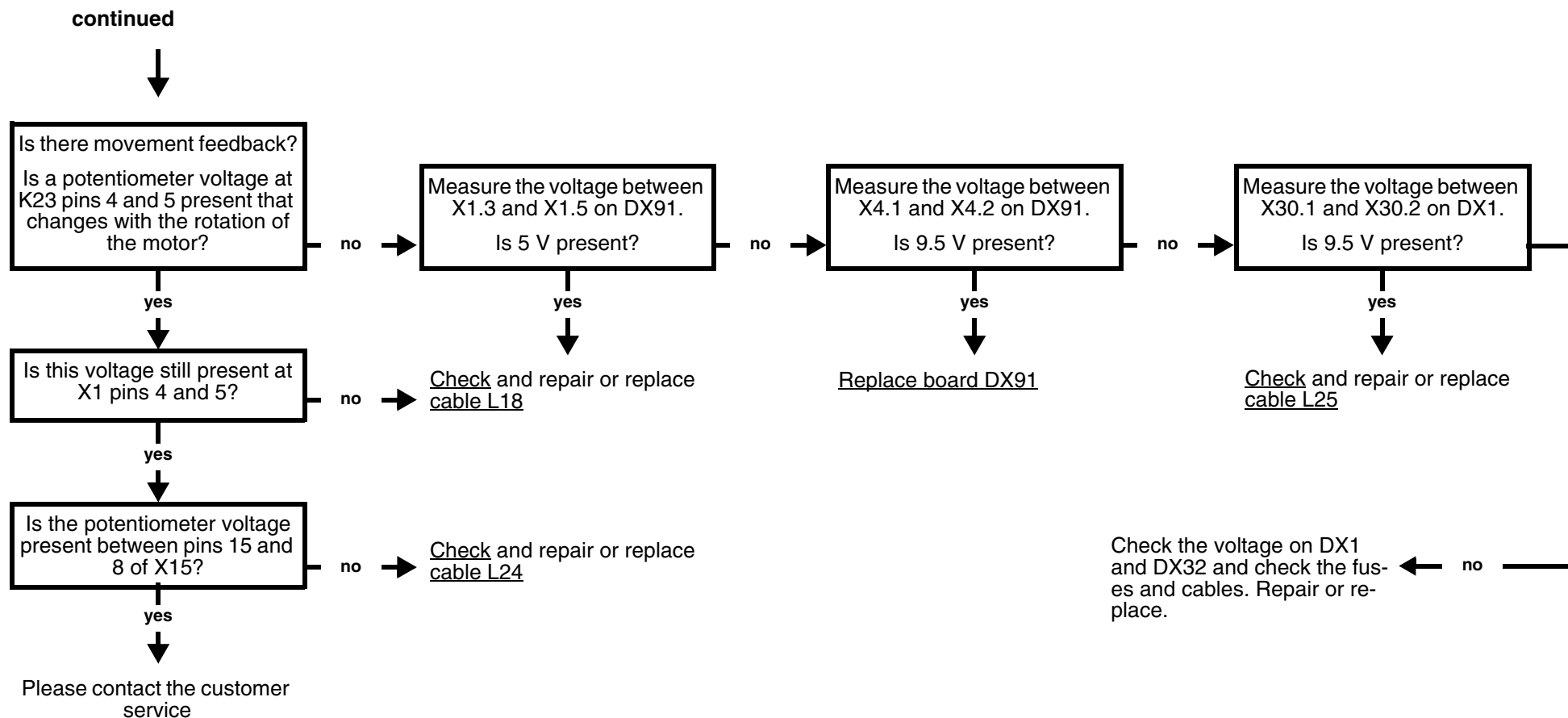
**ORTHOPHOS Plus DS Ceph**

- Check software version: With software version up to 06.10 / 03.12 and repeated occurrence, replace software.
- Check patient diaphragm for mechanical obstruction!
- Check the gear and confirm that the slipping clutch and the driving pinion are correctly mounted to the motor axis.



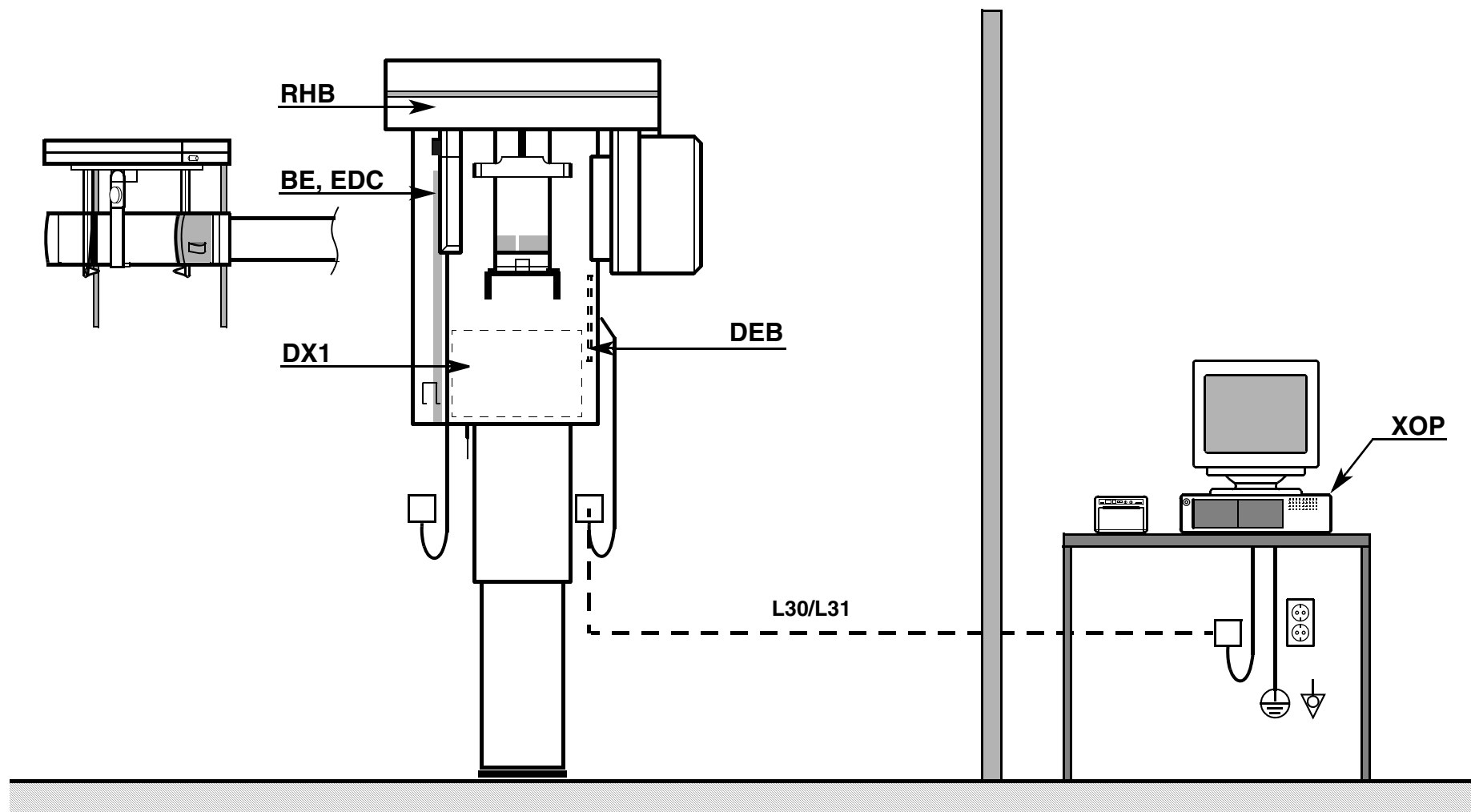
### 3.37 Correcting error of message E4 04: Motor M8 for secondary diaphragm not moving.



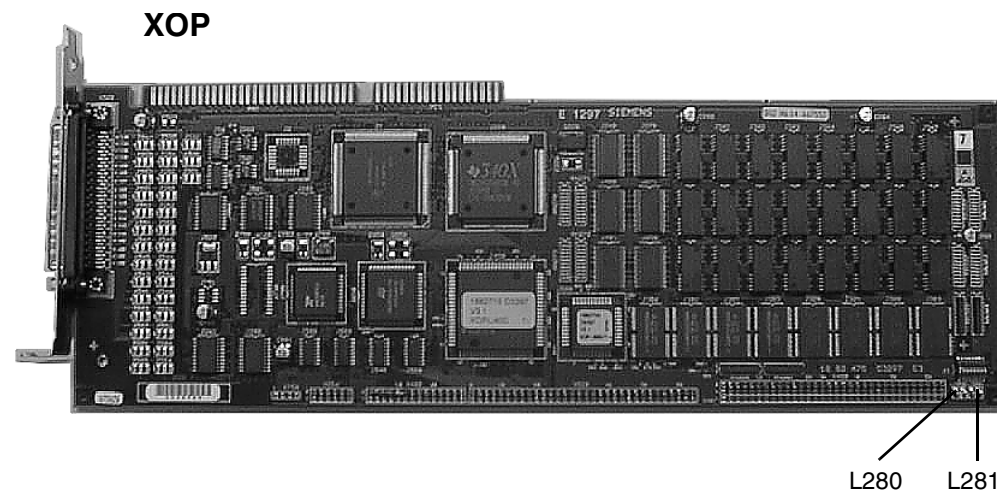
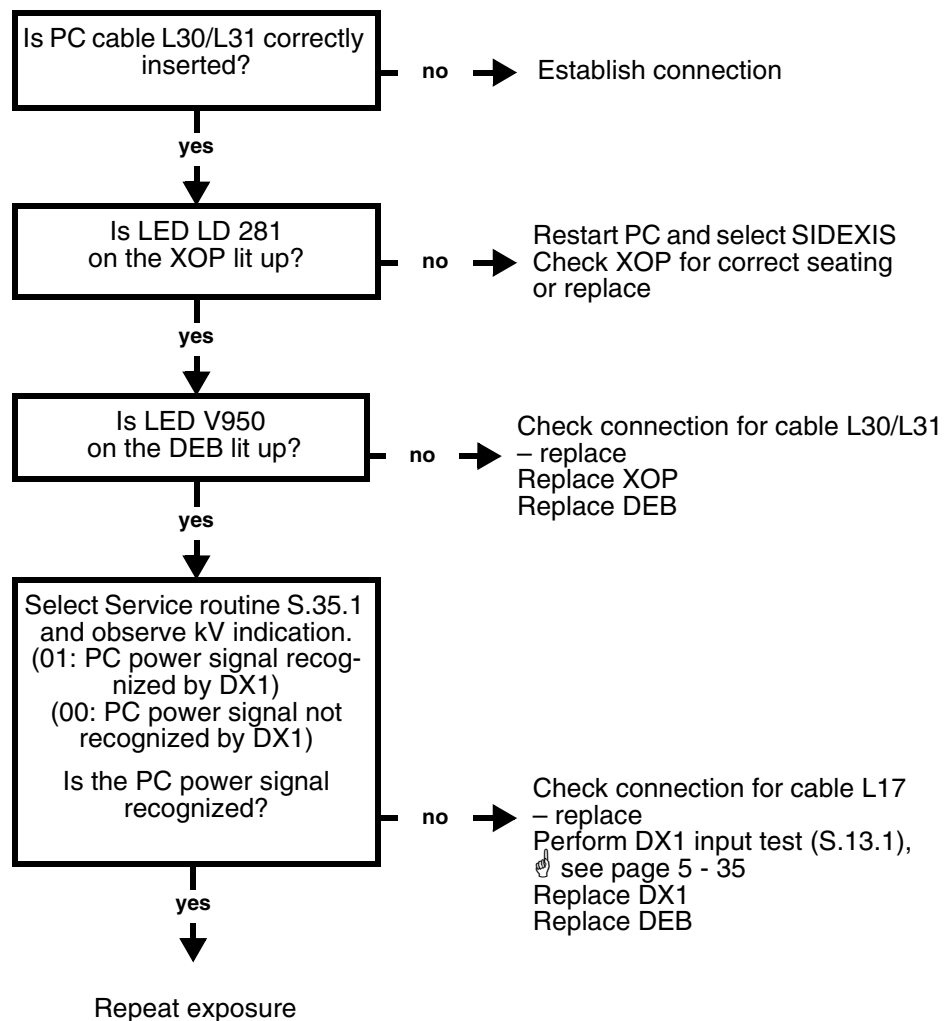


### 3.37 Correcting error of message E4 04: Motor M8 for secondary diaphragm not moving

up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph

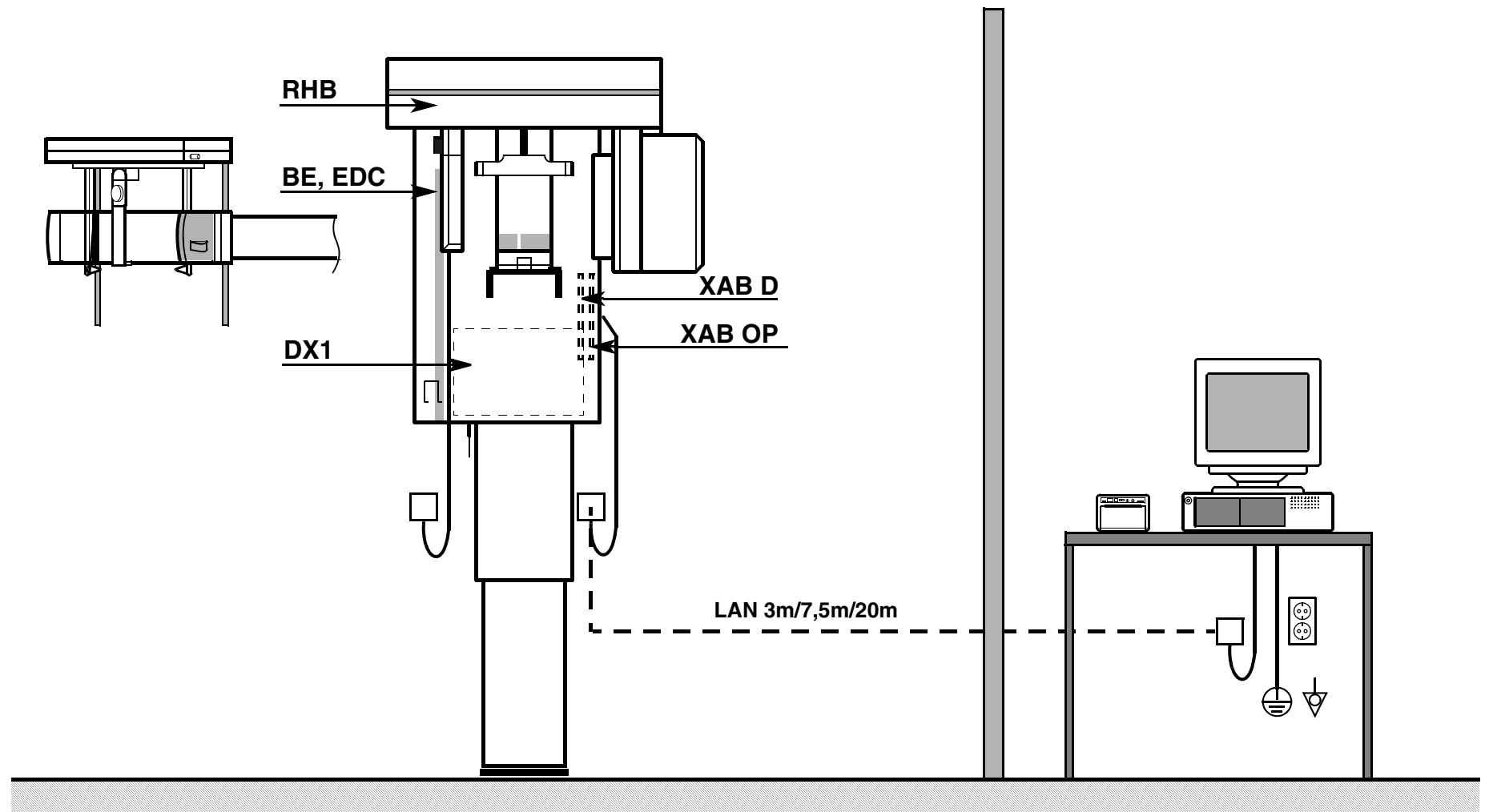


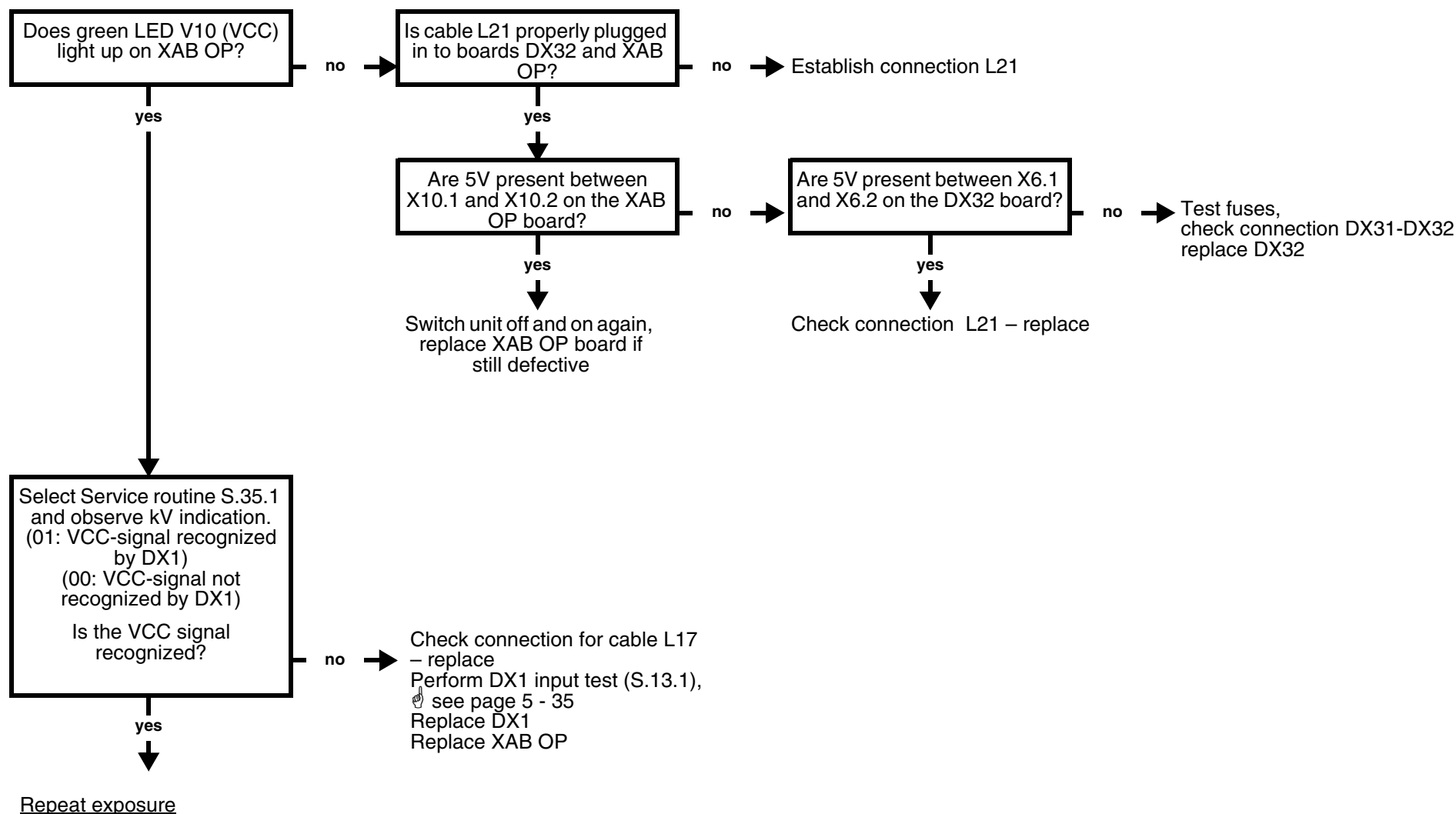




### 3.38 Correcting error of message E4 06: Fault at one of the supply voltages (with XOP)

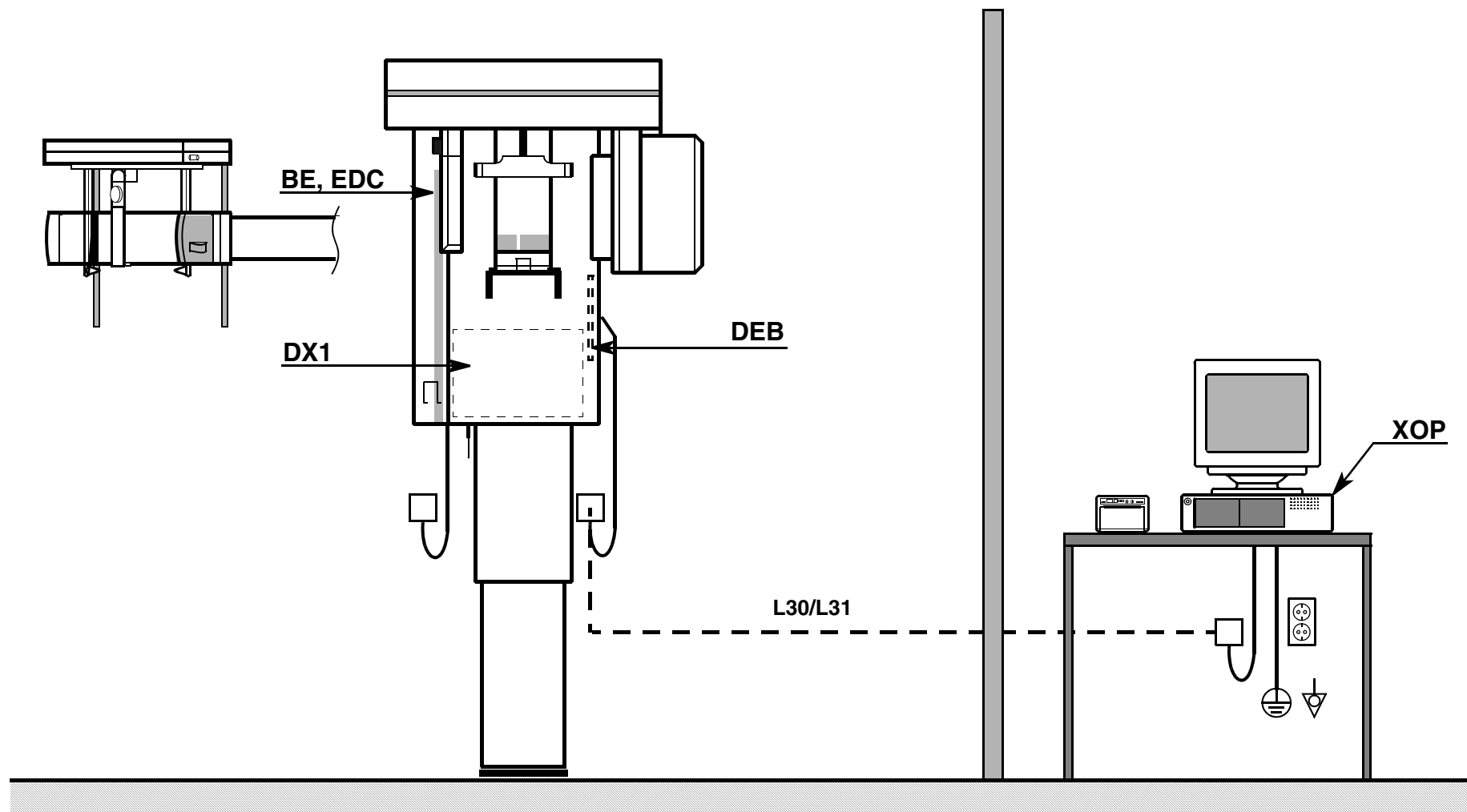
from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



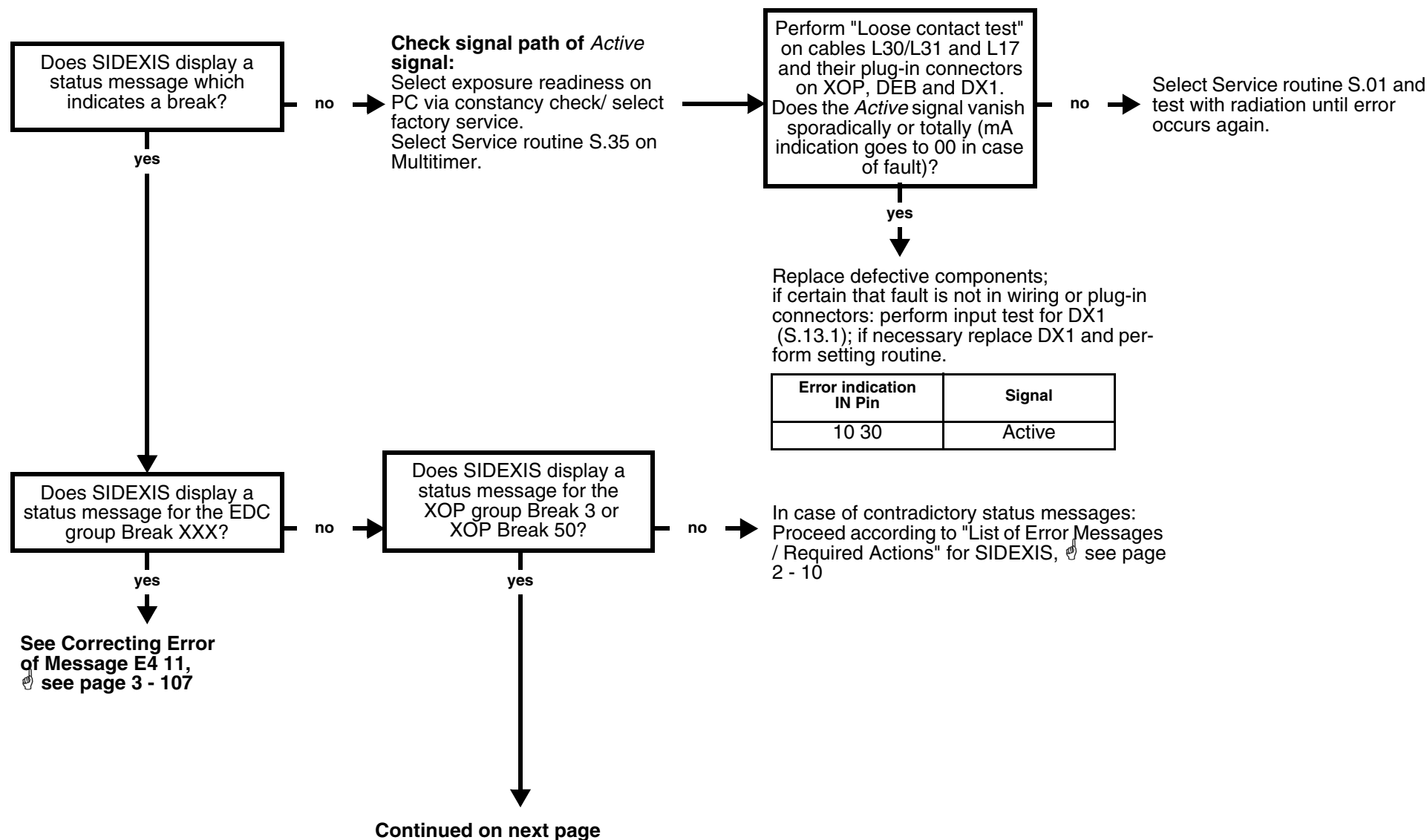


### 3.39 Correcting error of message E4 06: Fault at one of the supply voltages (with XAB)

up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph

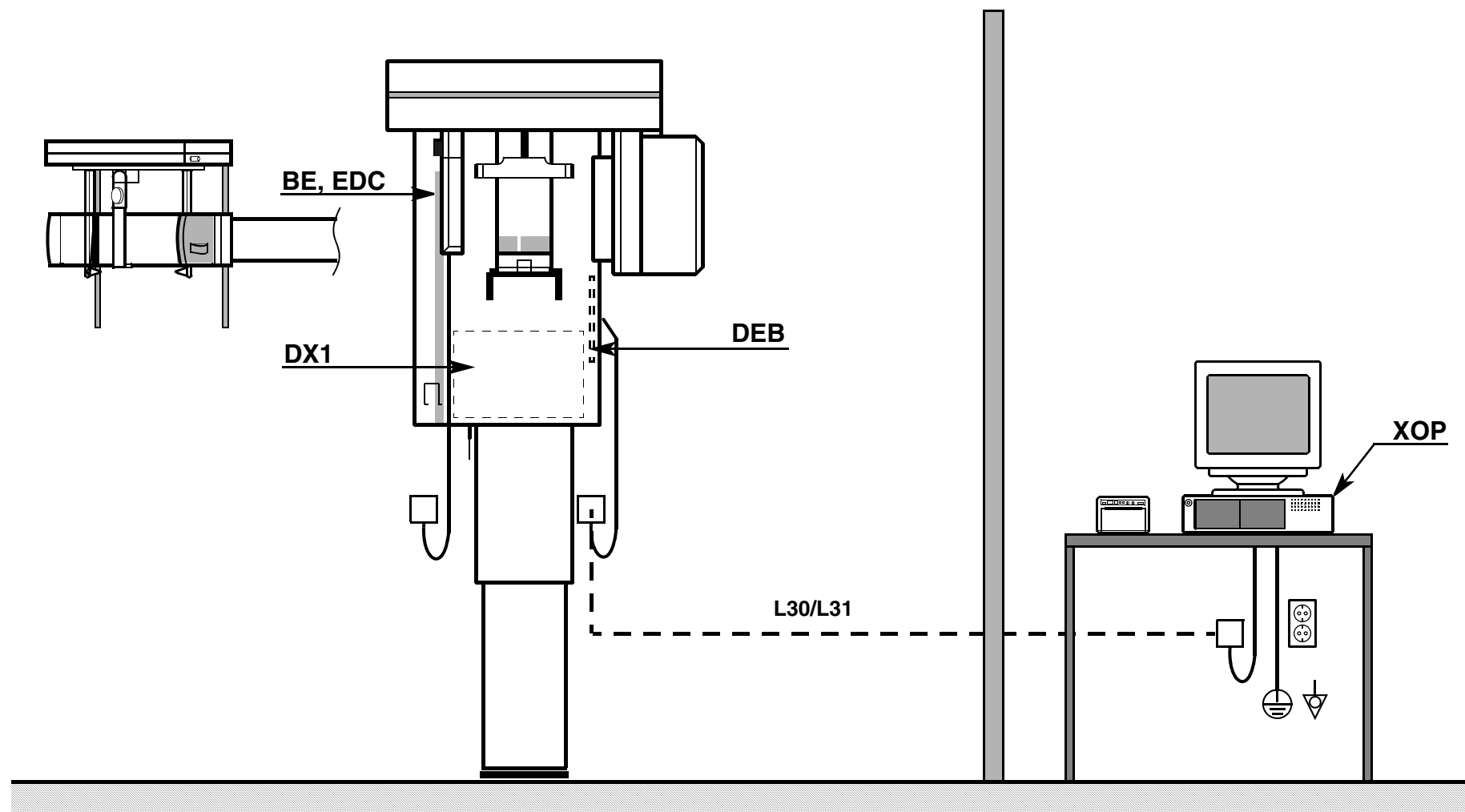


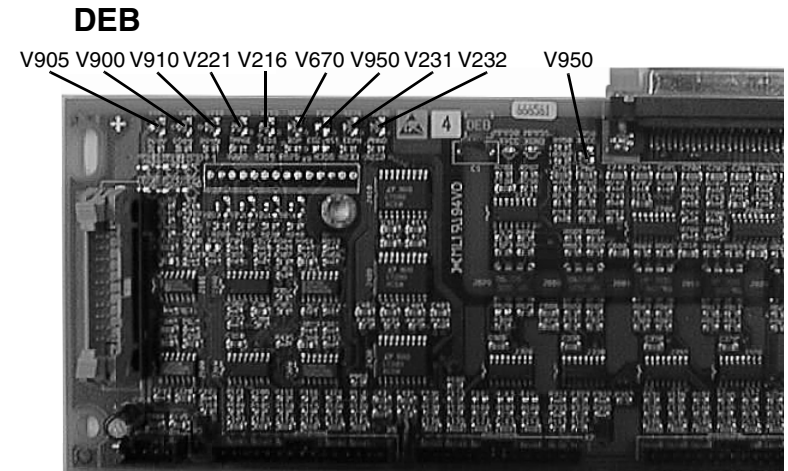
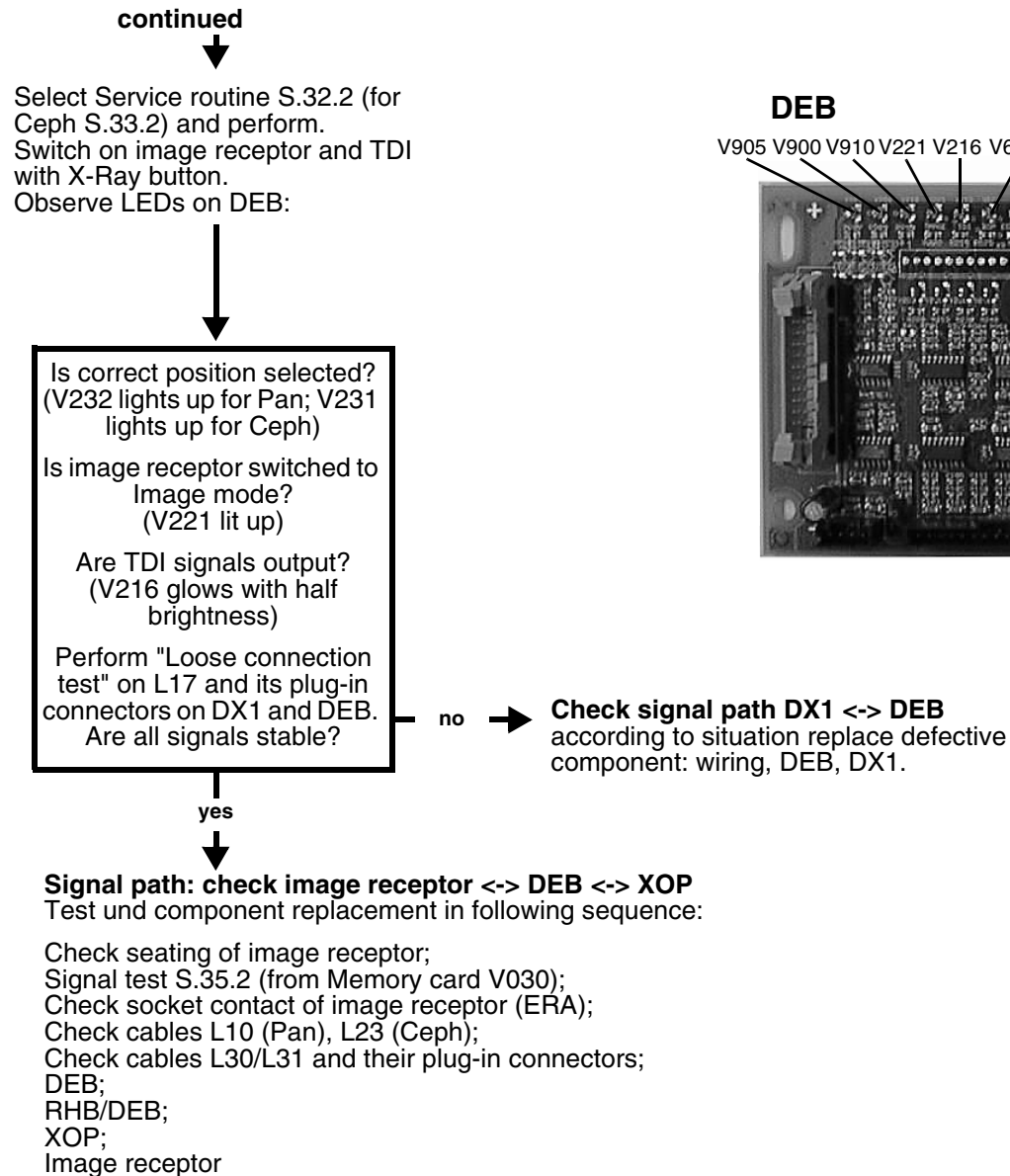
for normal operation only



### 3.40 Correcting error of message E4 08: Aborted by SIXELIS during radiation (with XOP)

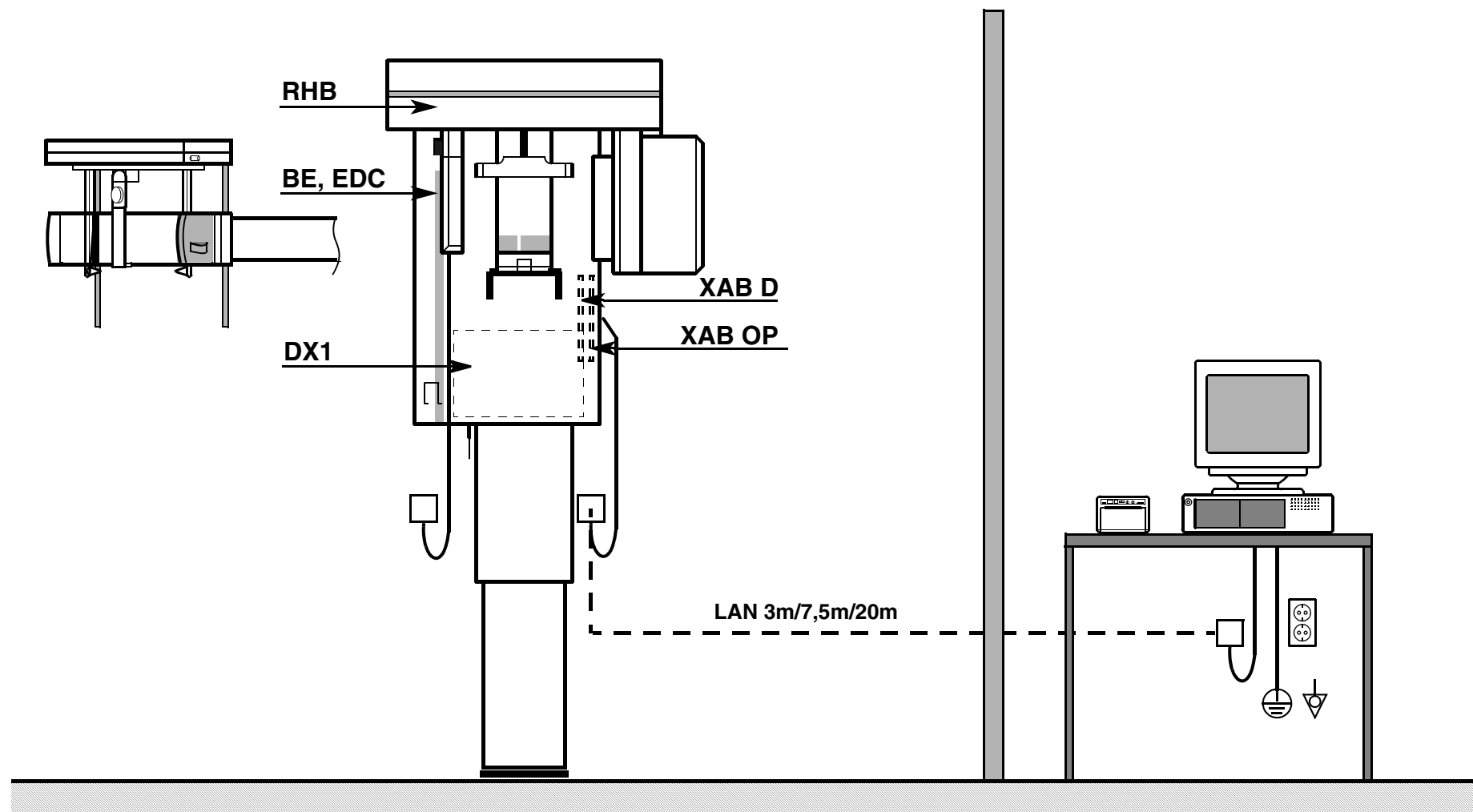
up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph





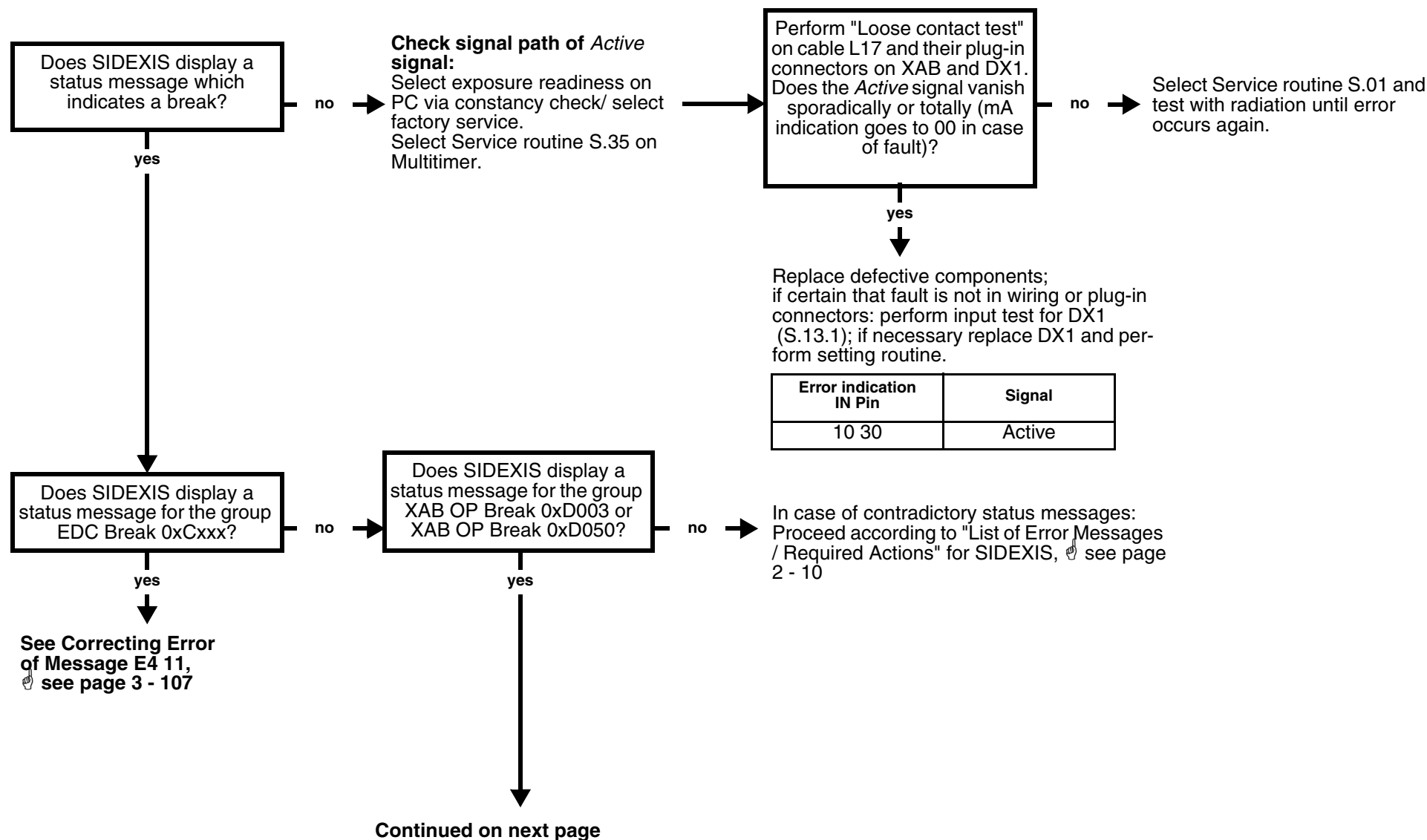
### 3.40 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XOP)

from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



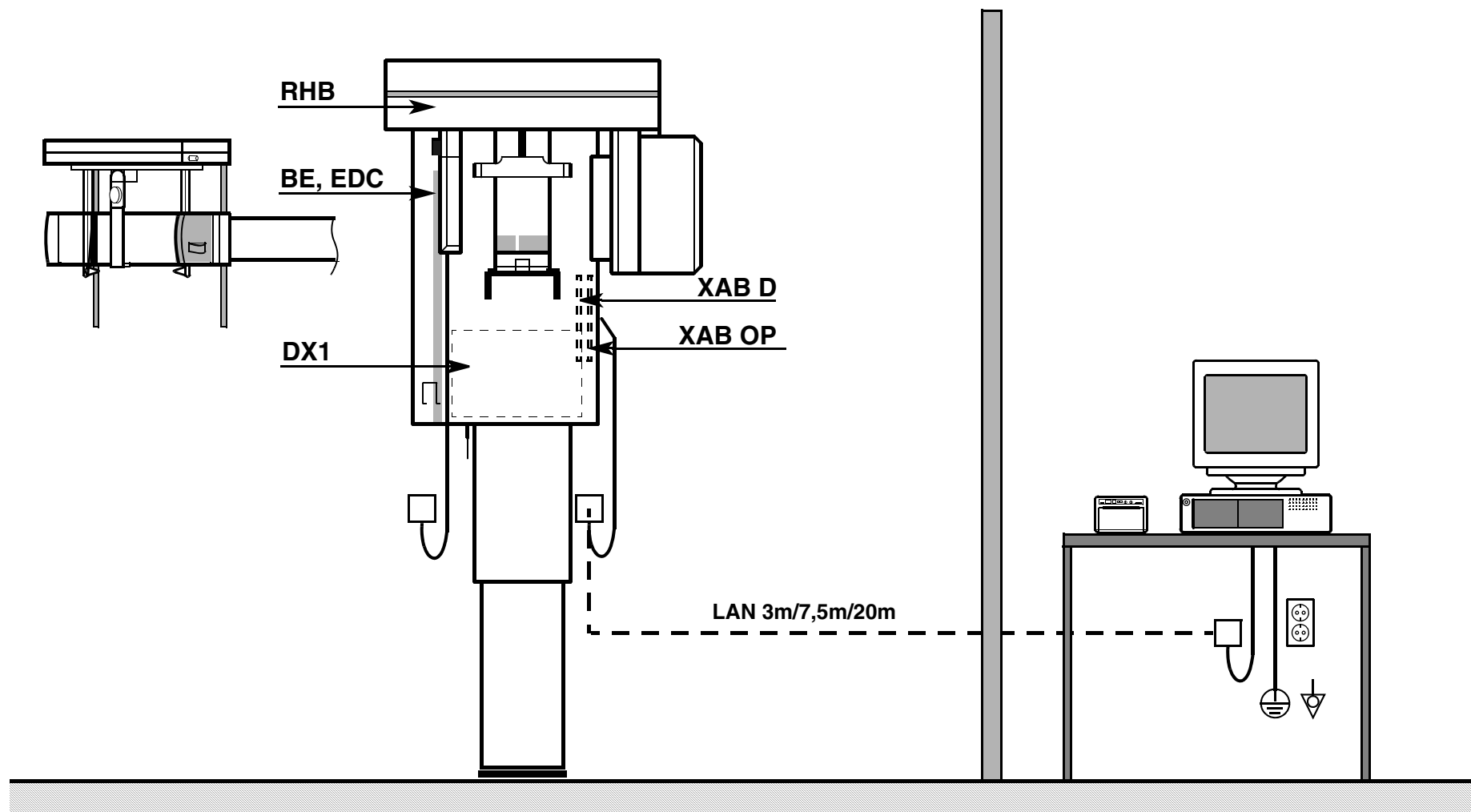


for normal operation only



### 3.41 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XAB)

from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



continued

Select Service routine S.32.2 (for Ceph S.33.2) and perform.  
Switch on image receptor and TDI with X-Ray button.  
Observe LEDs on XAB OP:

Is correct position selected?  
(V8 lights up for Pan;  
V7 lights up for Ceph)  
Is image receptor switched to Image mode?  
(V6 lit up)  
Are TDI signals output?  
(V5 glows with half brightness)  
Perform "Loose connection test" on L17 and its plug-in connectors on DX1 and XAB OP.  
Are all signals stable?

no

**Check signal path DX1 <-> XAB OP**  
according to situation replace defective component: wiring, XAB OP, DX1.

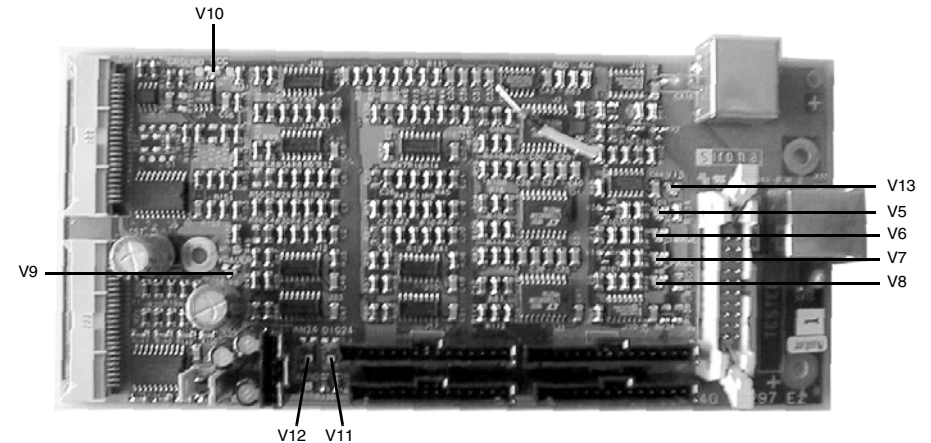
yes

**Signal path: check image receptor <-> XAB OP**

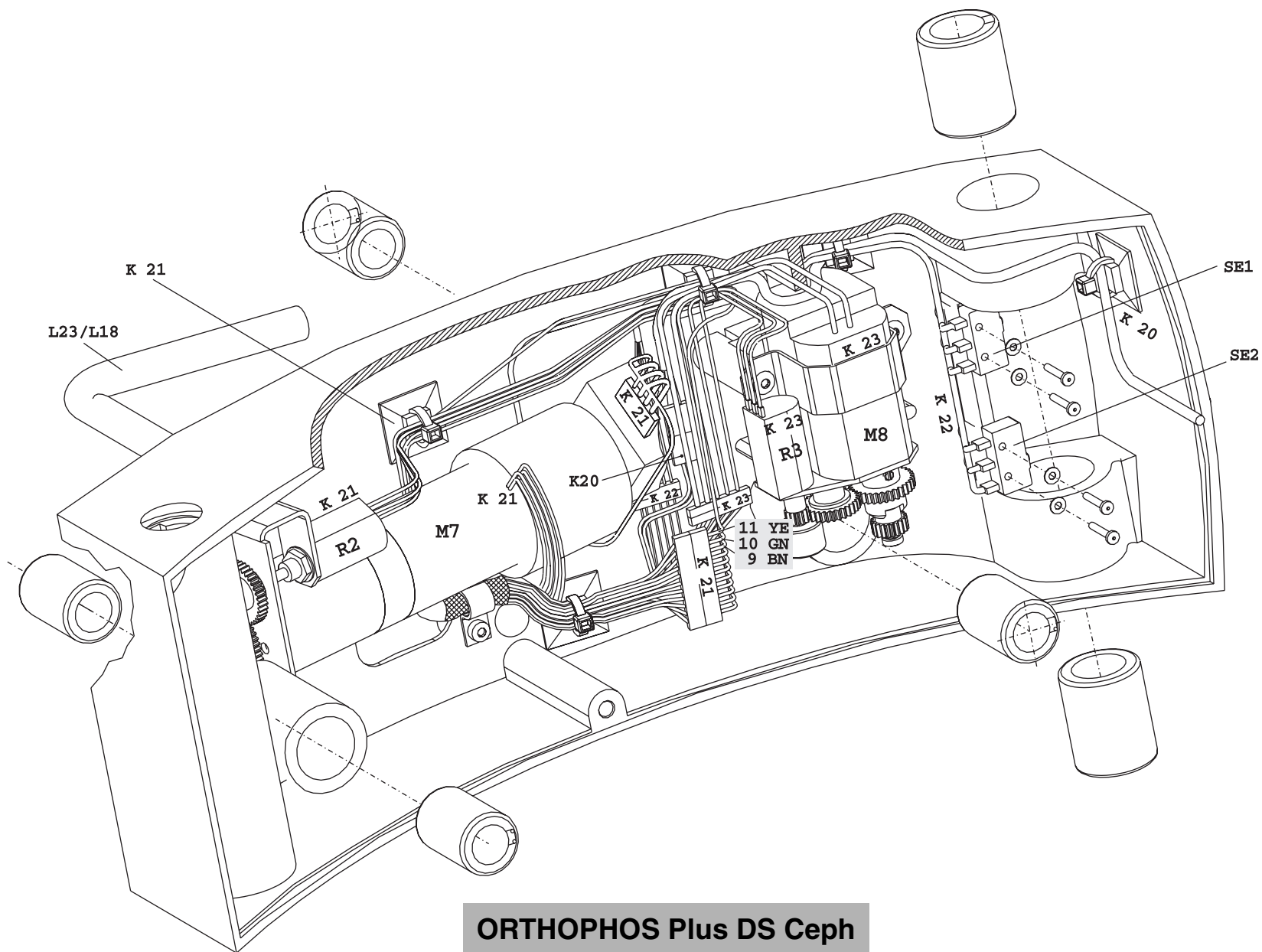
Test und component replacement in following sequence:

Check seating of image receptor;  
Signal test S.35.1 (from Memory card V030);  
S.32.1(Pan), S.33.1 (Ceph)  
Check socket contact of image receptor (ERA);  
Check RHB  
Check cables L10 (Pan), L23 (Ceph);  
Check XAB OP;  
Check LAN cables and their connectors;  
PC

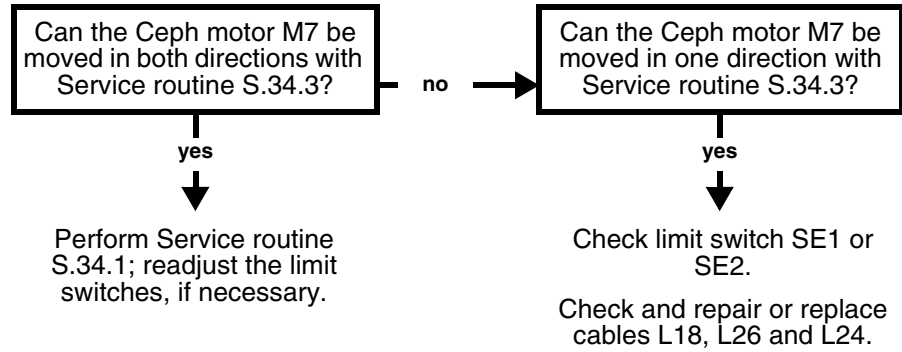
**XAB OP**



### 3.41 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XAB)

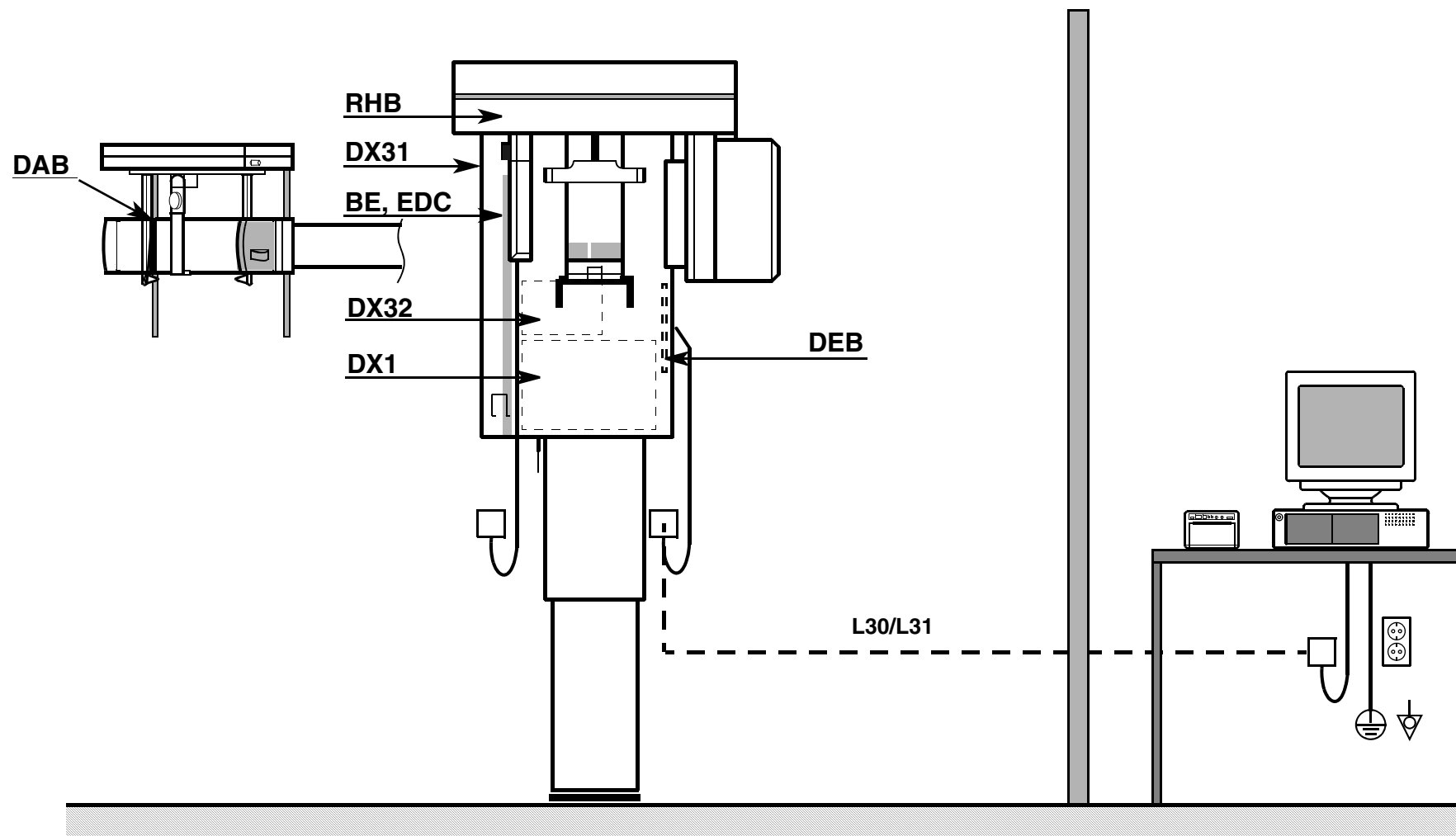


**ORTHOPHOS Plus DS Ceph**



### 3.42 Correcting error of message E4 09: Faulty signal from limit switches of Ceph drive.

up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph

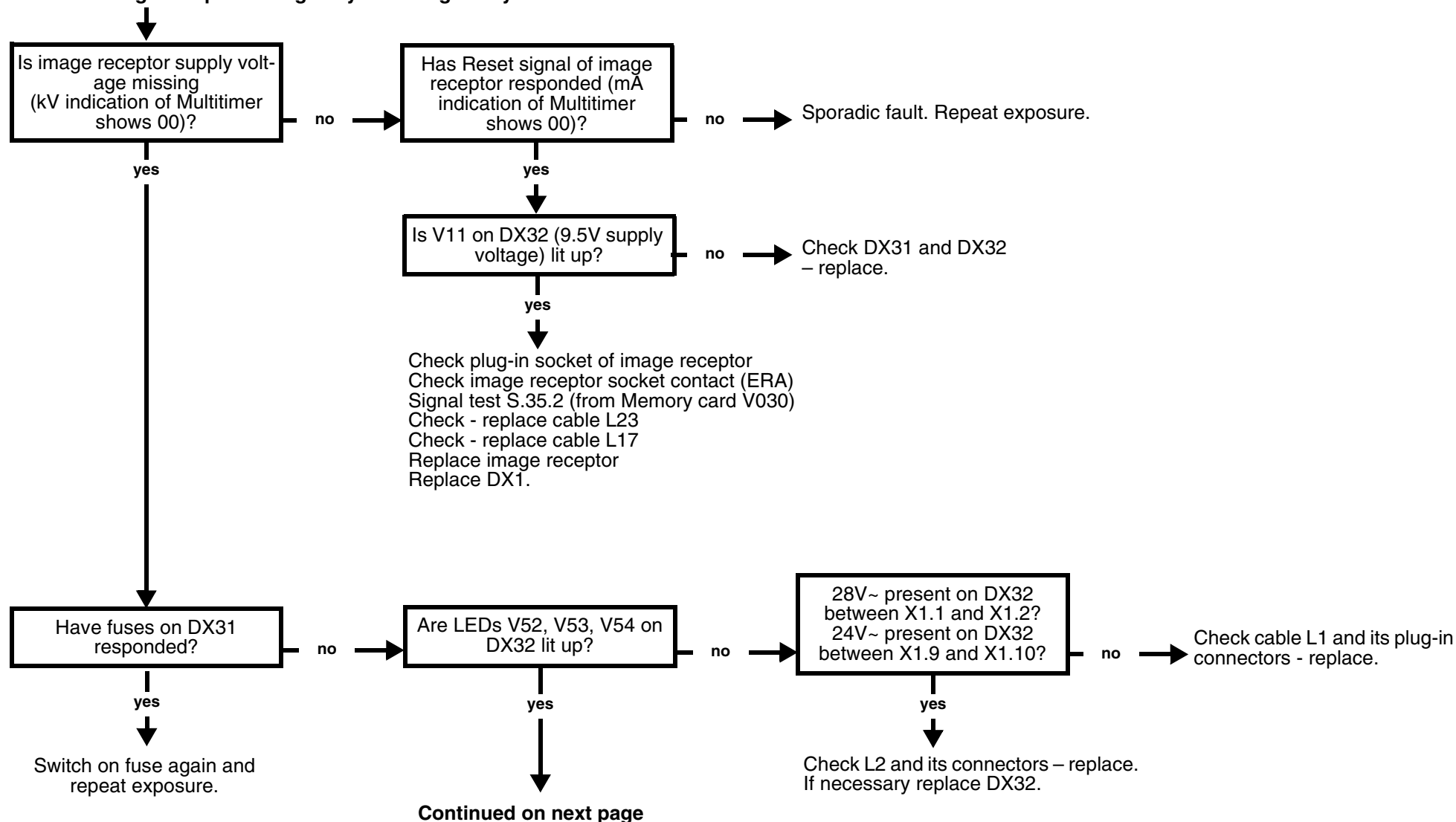


**CAUTION: Always switch the unit OFF before connecting a measuring instrument or replacing any components!**

54 53 571 D 3297  
D 3297.077.01.10.02 04.2007

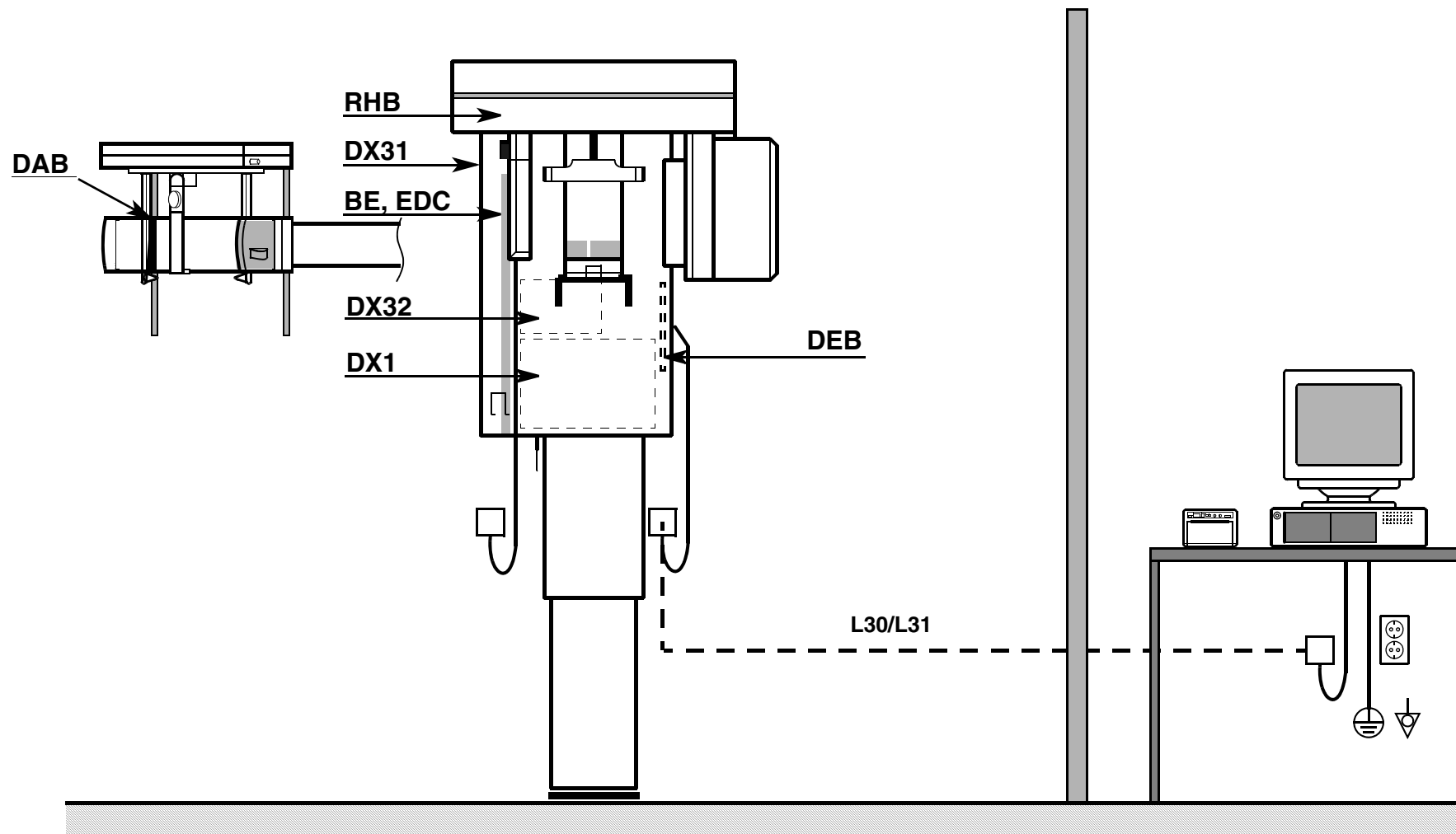
Perform Service routine S.32.1 (Pan) or S.33.1 (Ceph).

Switch on image receptor voltages by actuating X-Ray button.

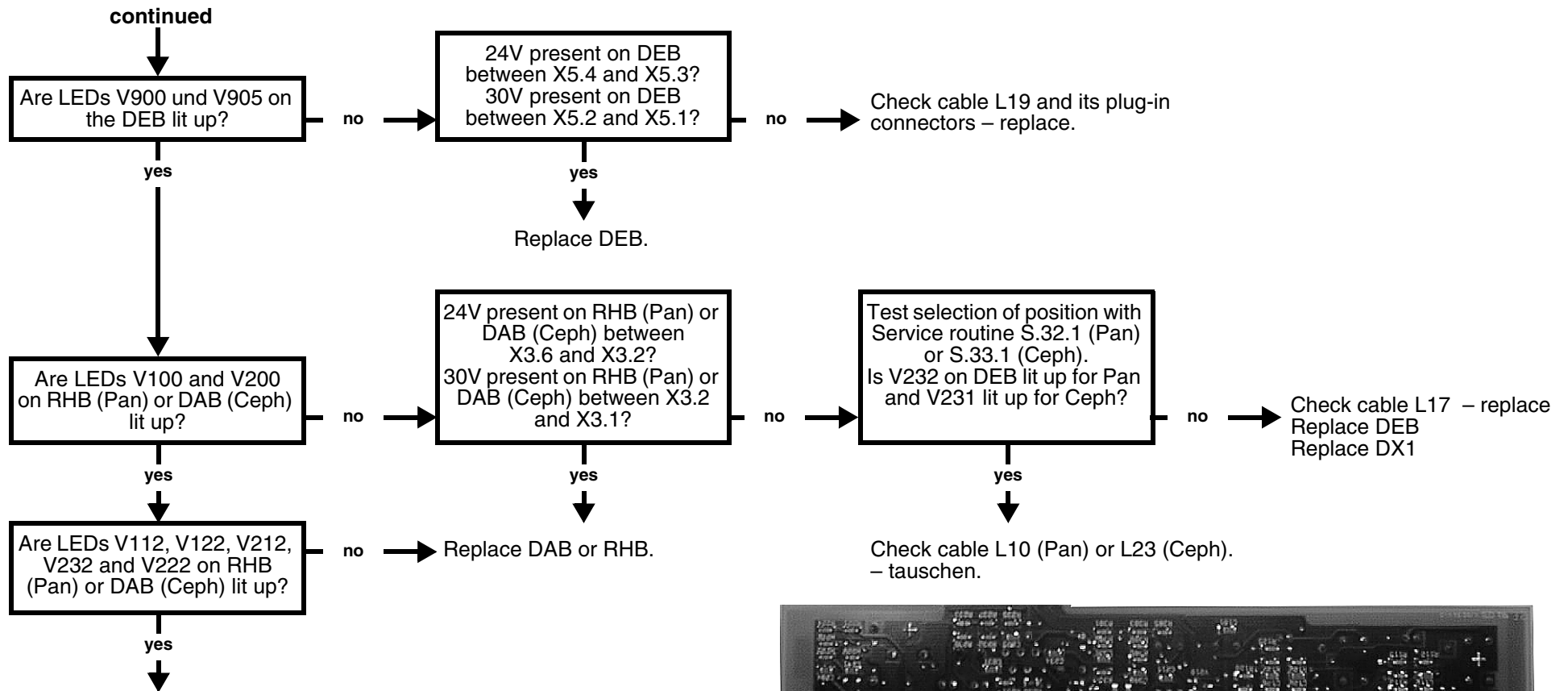


### 3.43 Correcting error of message E4 11: Image receptor not ready for exposure (with XOP)

up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph





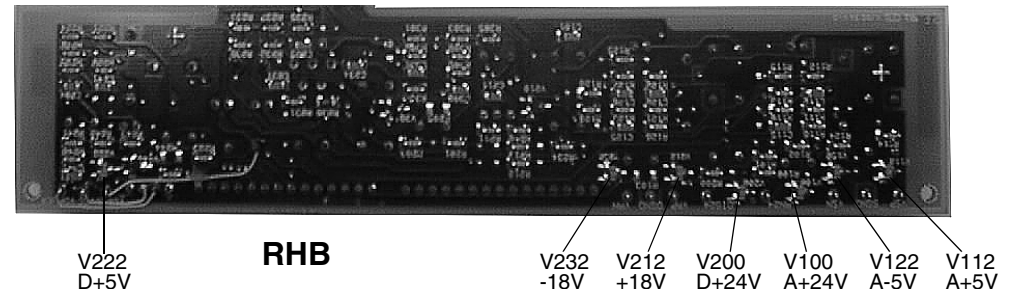


#### Check signal path for voltage status signal

Tests and component replacement in following sequence:

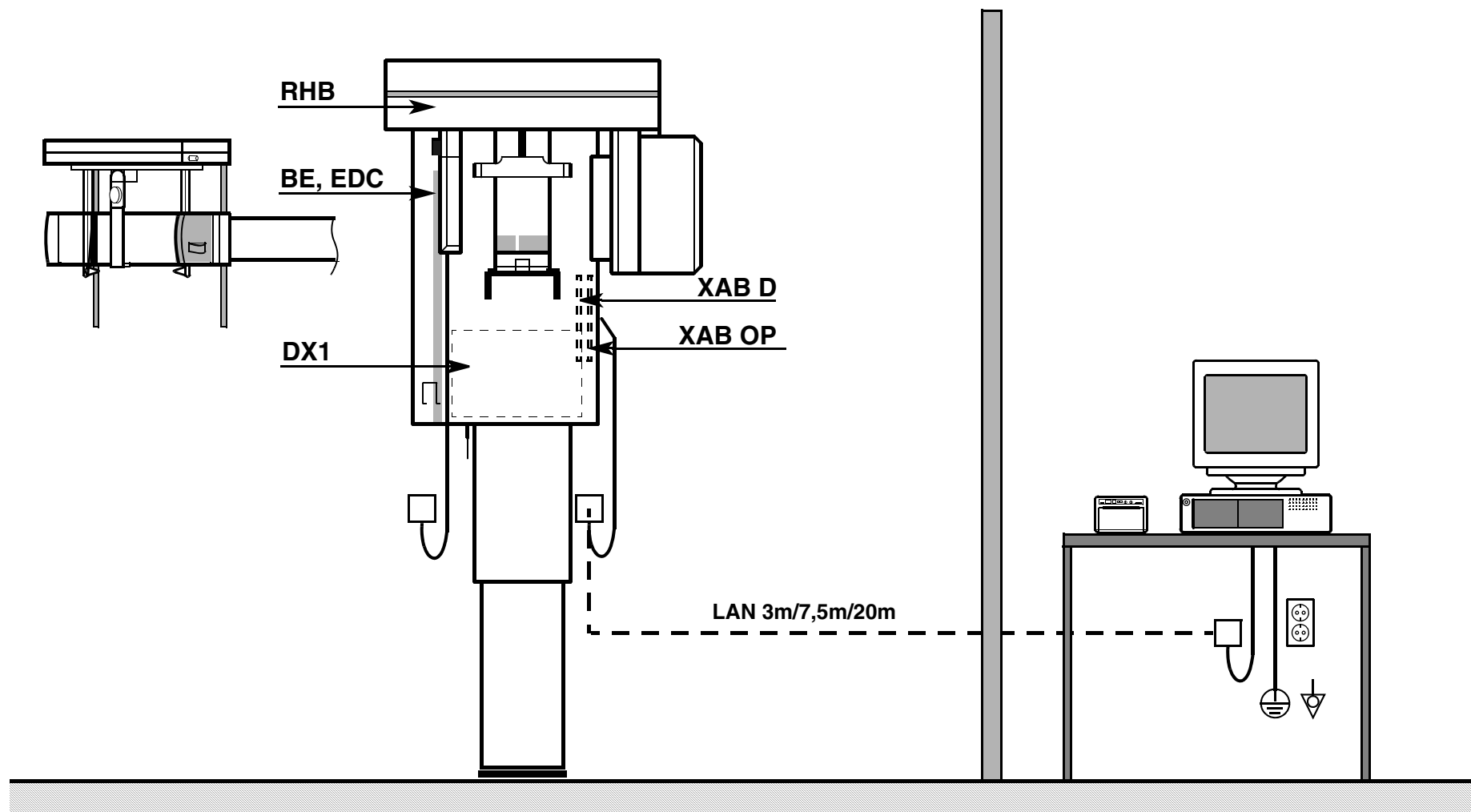
Check seating of image receptor;  
Signal test S.35.2 (from Memory card V030);  
Check socket contact of image receptor (ERA);  
Check cable L17;  
Check cables L30/L31 and their plug-in connectors;  
DEB;  
RHB/DAB;  
Input test DX1 with S.13.1;  
Image receptor

| Error indication<br>IN Pin | Signal |
|----------------------------|--------|
| 10 30                      | Active |



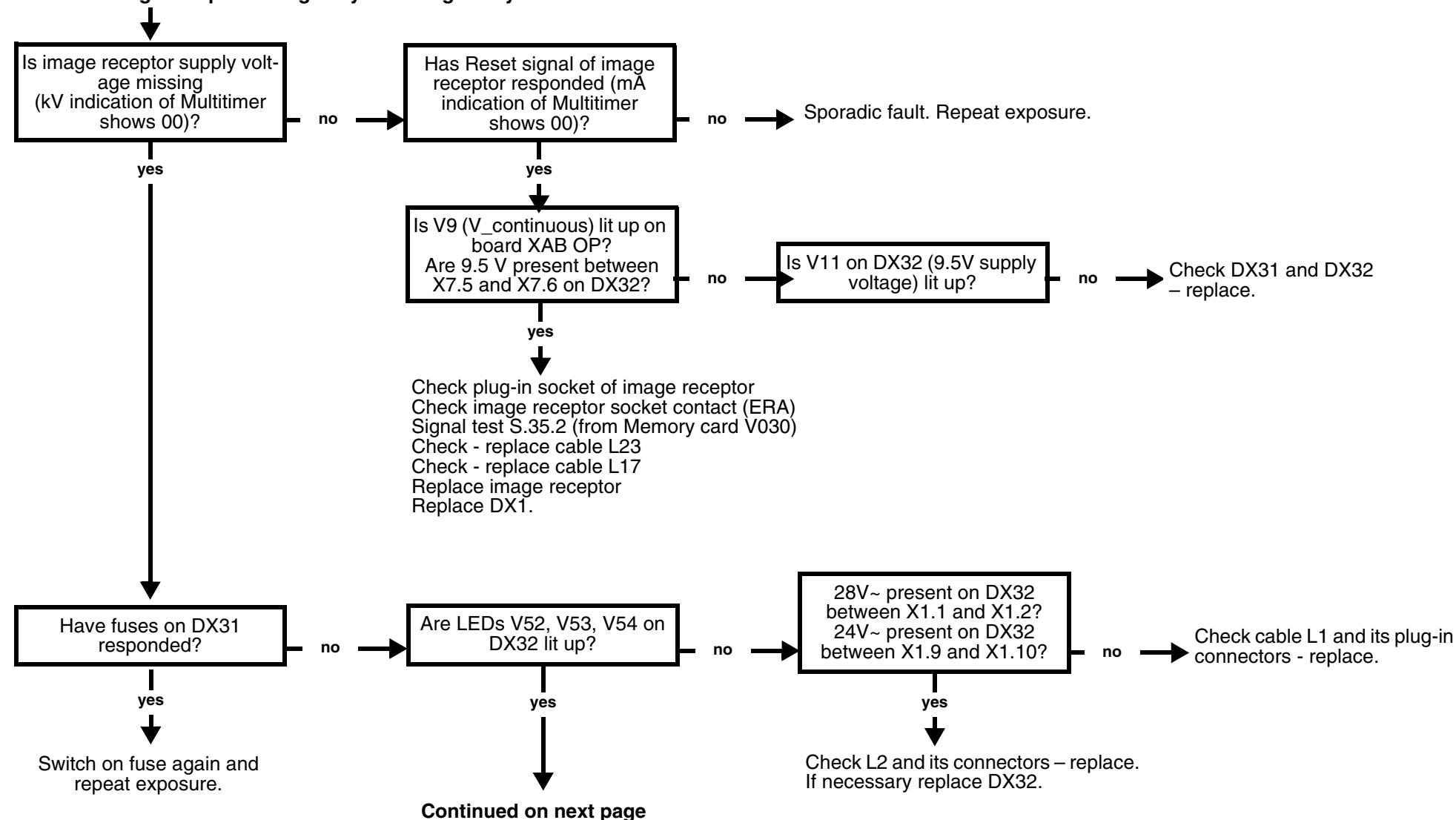
### 3.43 Correcting error for message E4 11: Image receptor not ready for exposure (with XOP)

from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



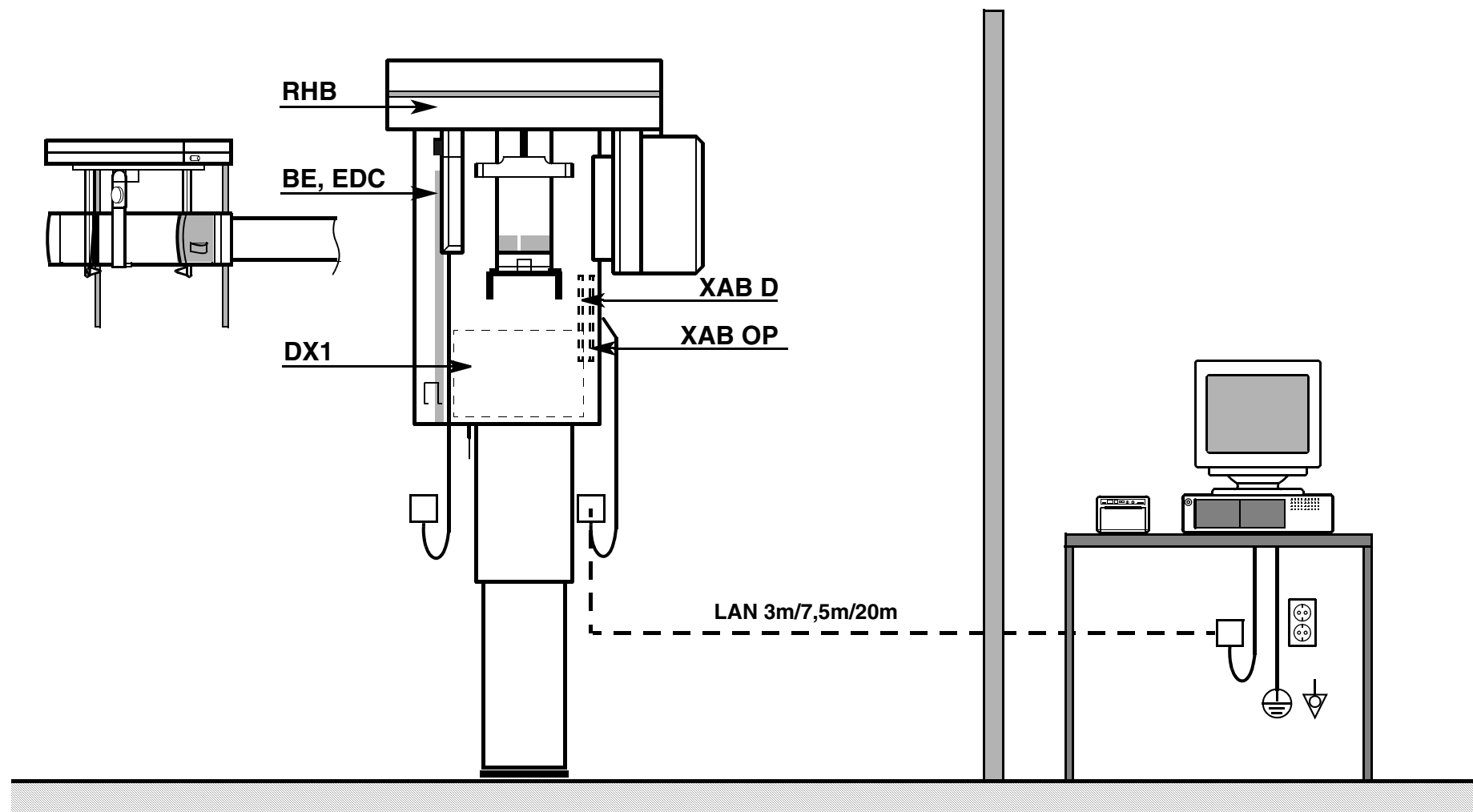
Perform Service routine S.32.1 (Pan) or S.33.1 (Ceph).

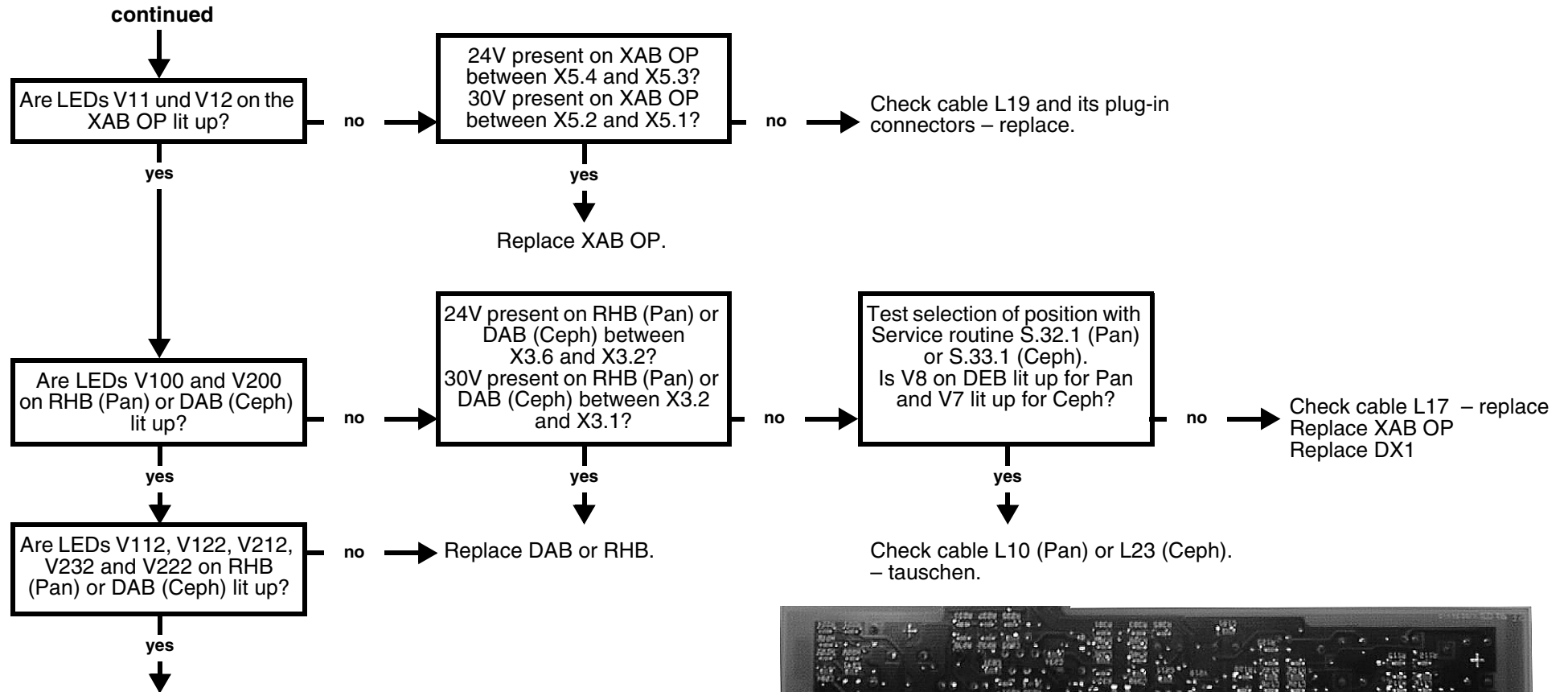
Switch on image receptor voltages by actuating X-Ray button.



### 3.44 Correcting error of message E4 11: Image receptor not ready for exposure (with XAB)

from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph

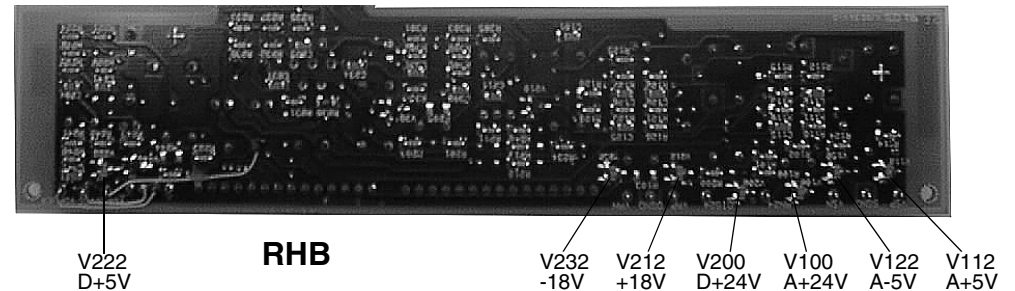




#### Check signal path for voltage status signal

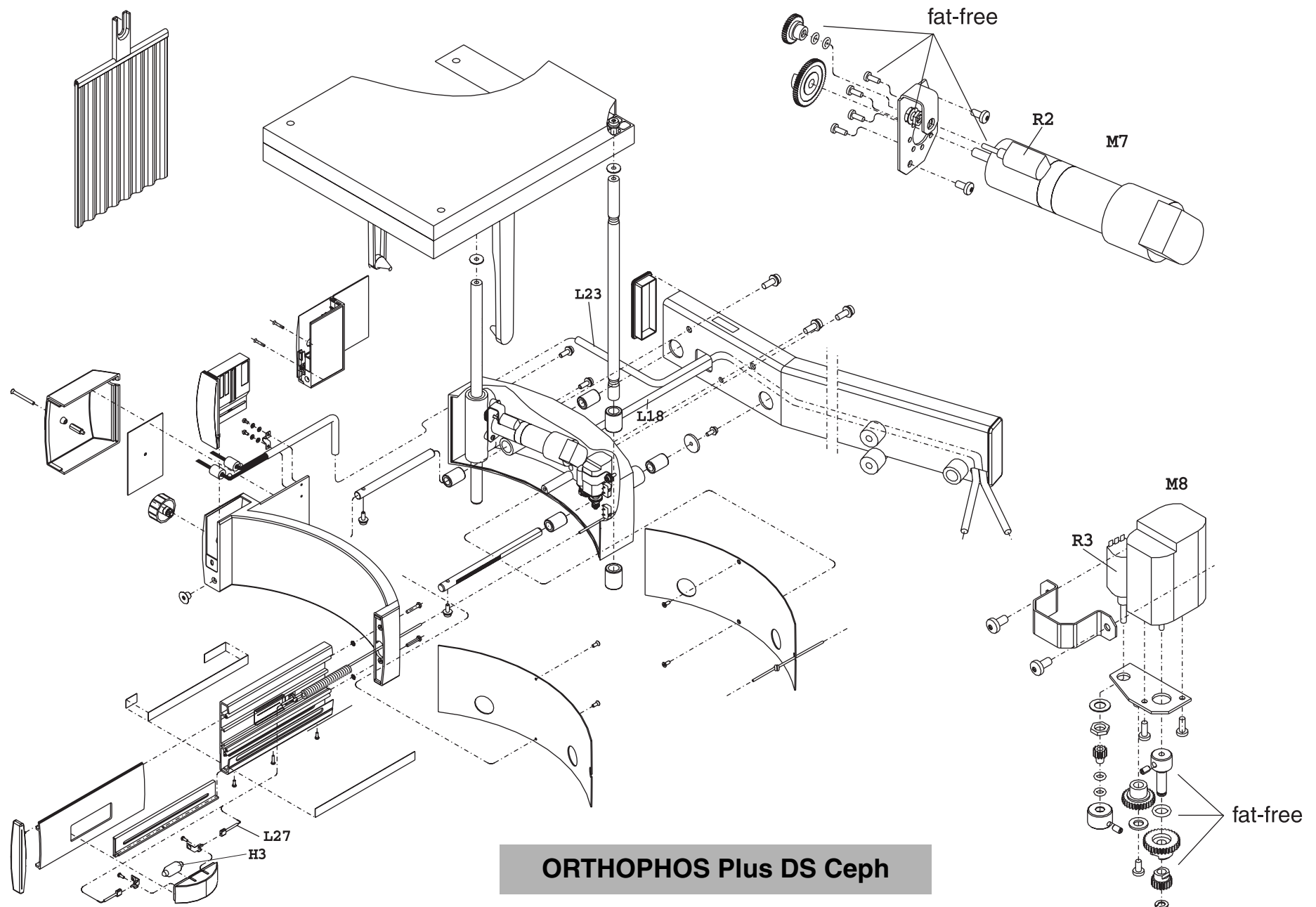
Tests and component replacement in following sequence:

Check seating of image receptor;  
Signal test S.35.2 (from Memory card V030);  
Check socket contact of image receptor (ERA);  
Check cable L17;  
XAB OP;  
RHB/DAB;  
Input test DX1 with S.13.1;  
Image receptor



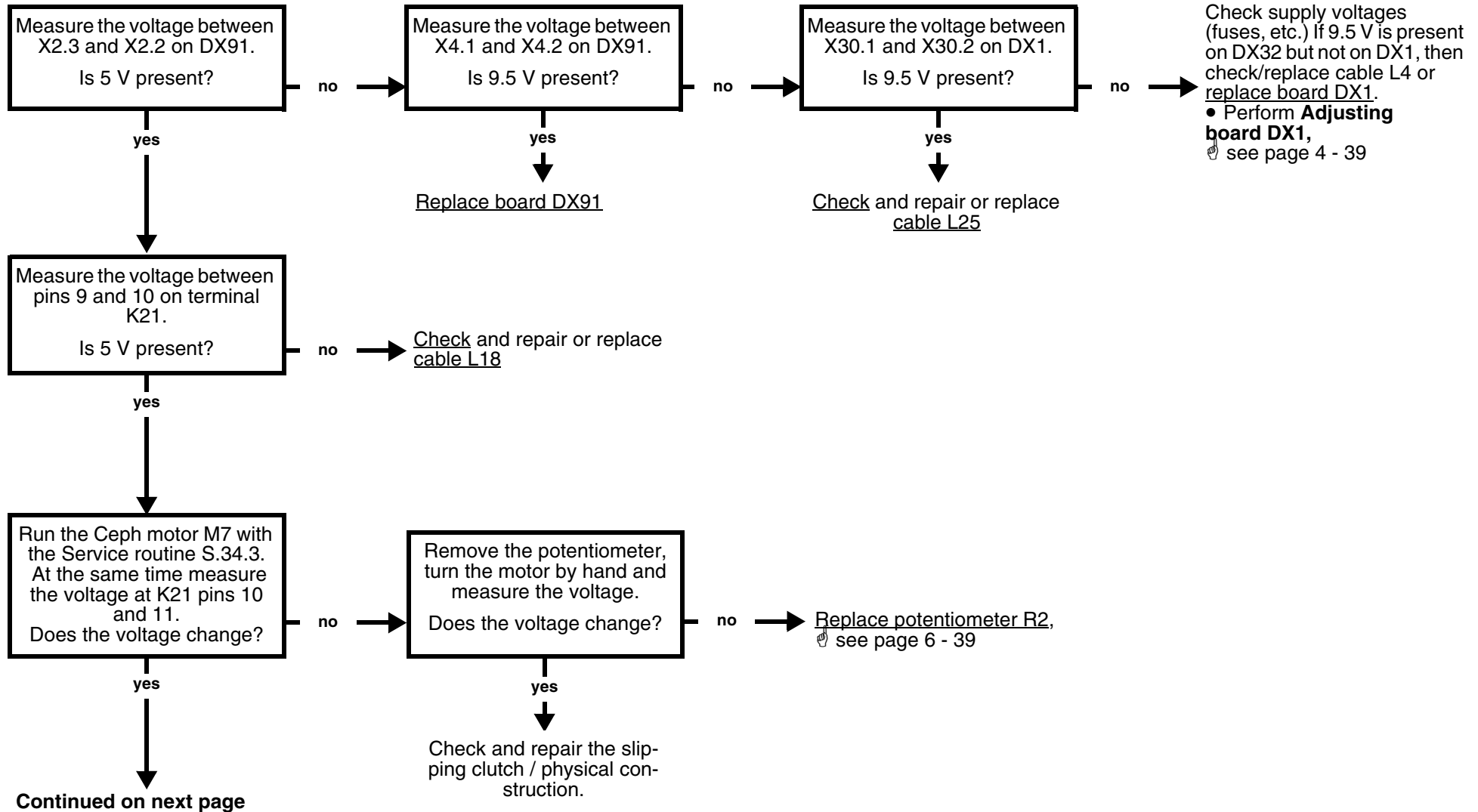
| Error indication<br>IN Pin | Signal |
|----------------------------|--------|
| 10 30                      | Active |

### 3.44 Correcting error of message E4 11: Image receptor not ready for exposure (with XAB)

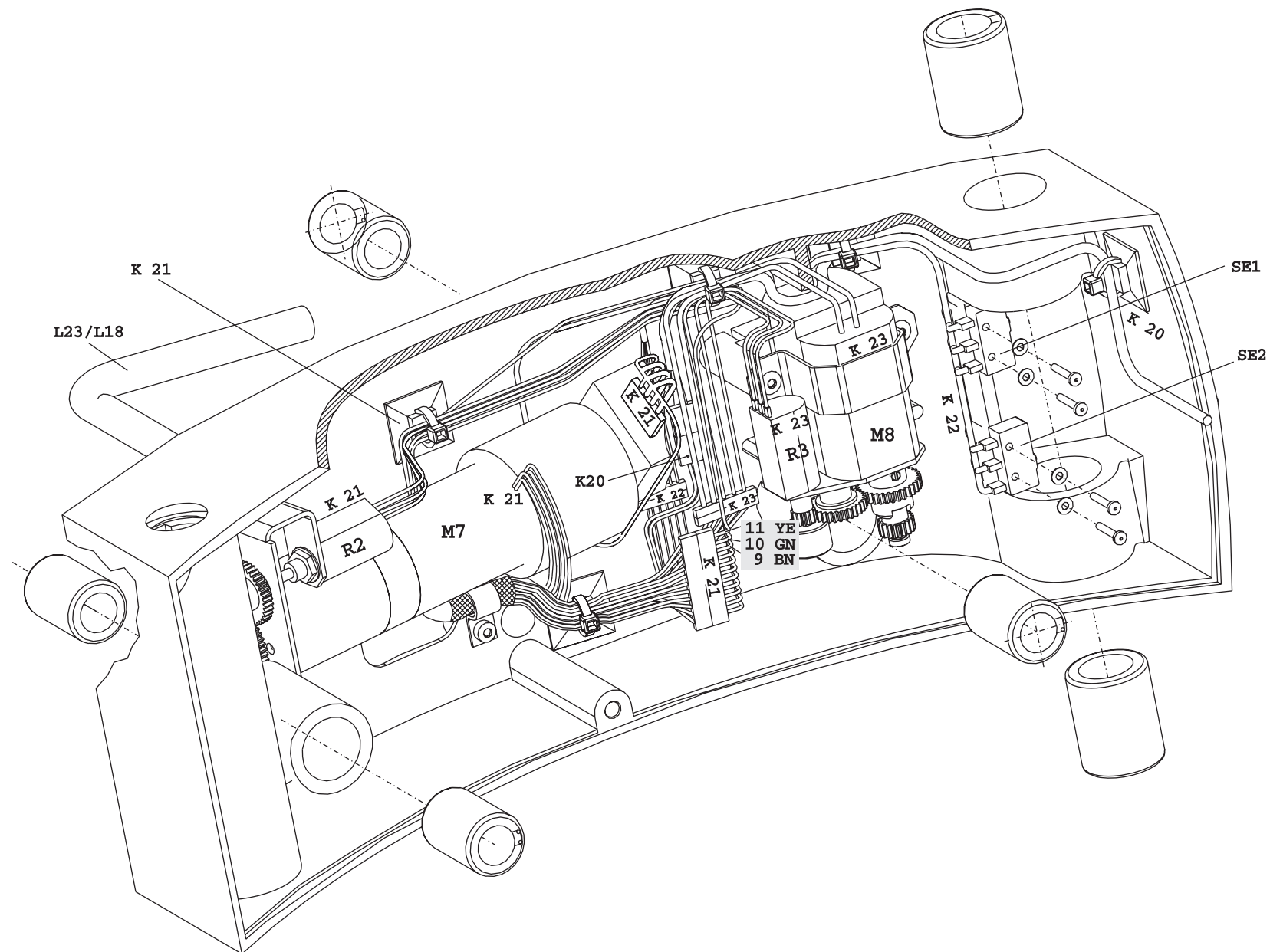


**ORTHOPHOS Plus DS Ceph**

- Check the physical construction of potentiometer R2!

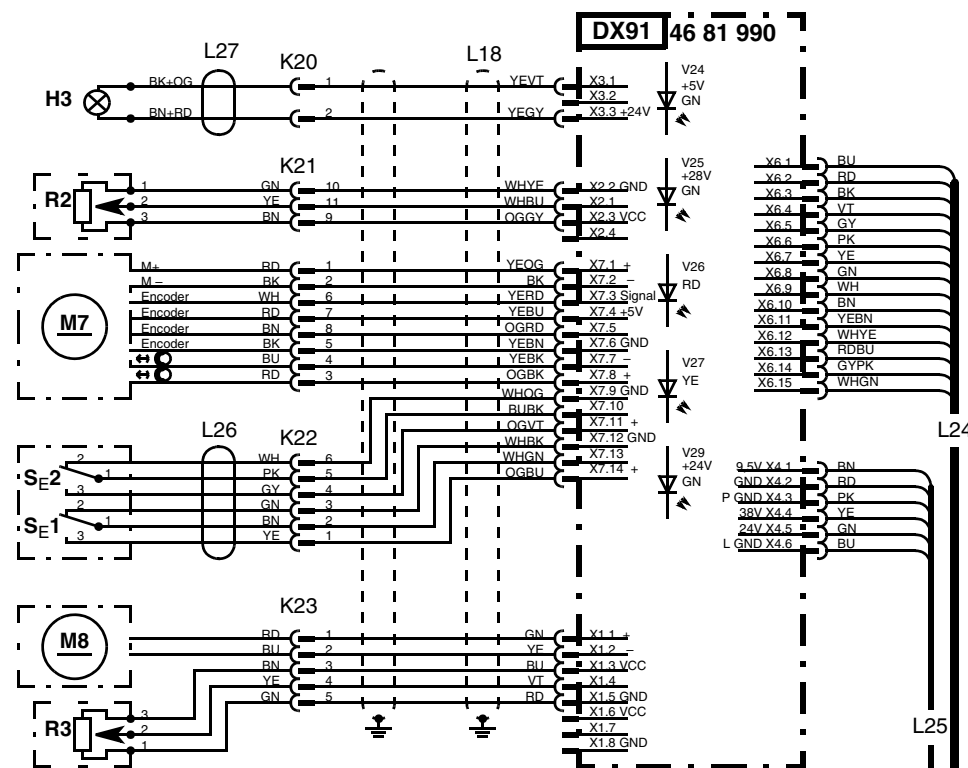
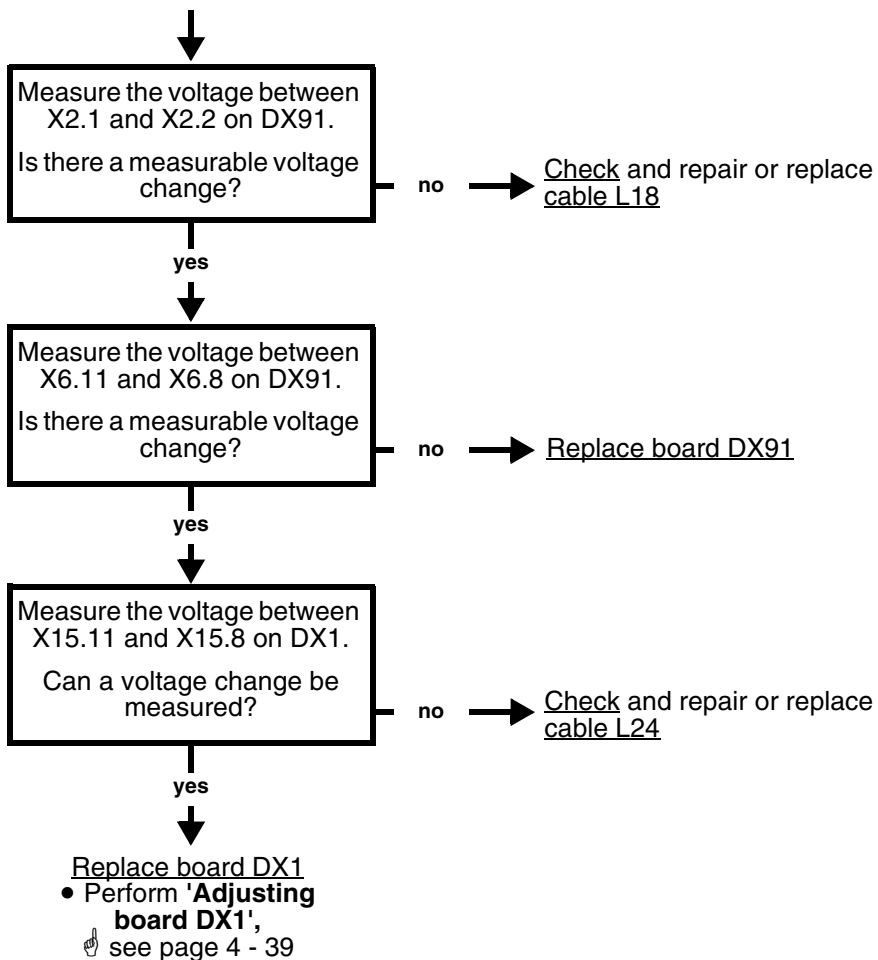


### 3.45 Correcting error of message E4 14: Ceph holder not moving.

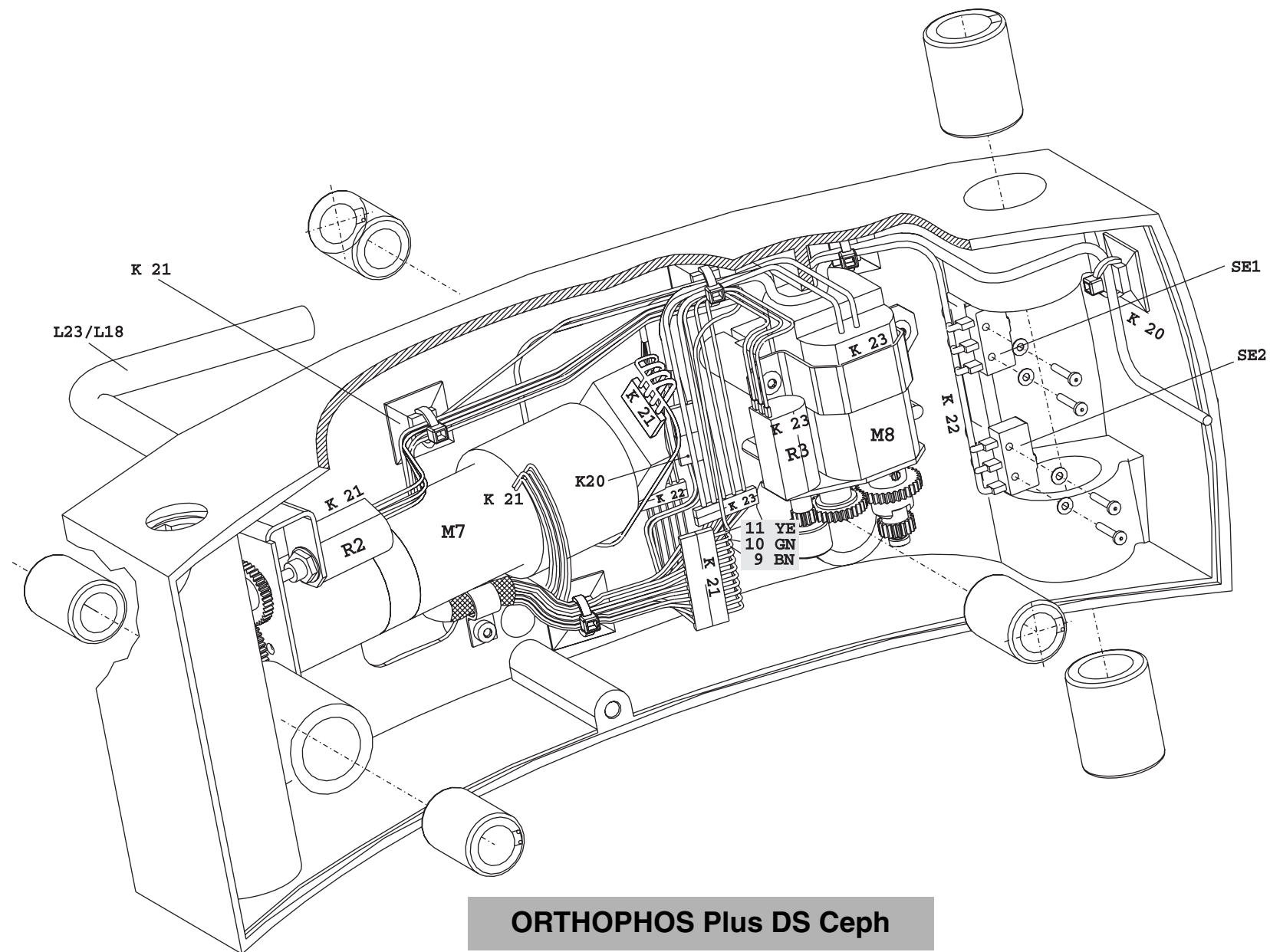




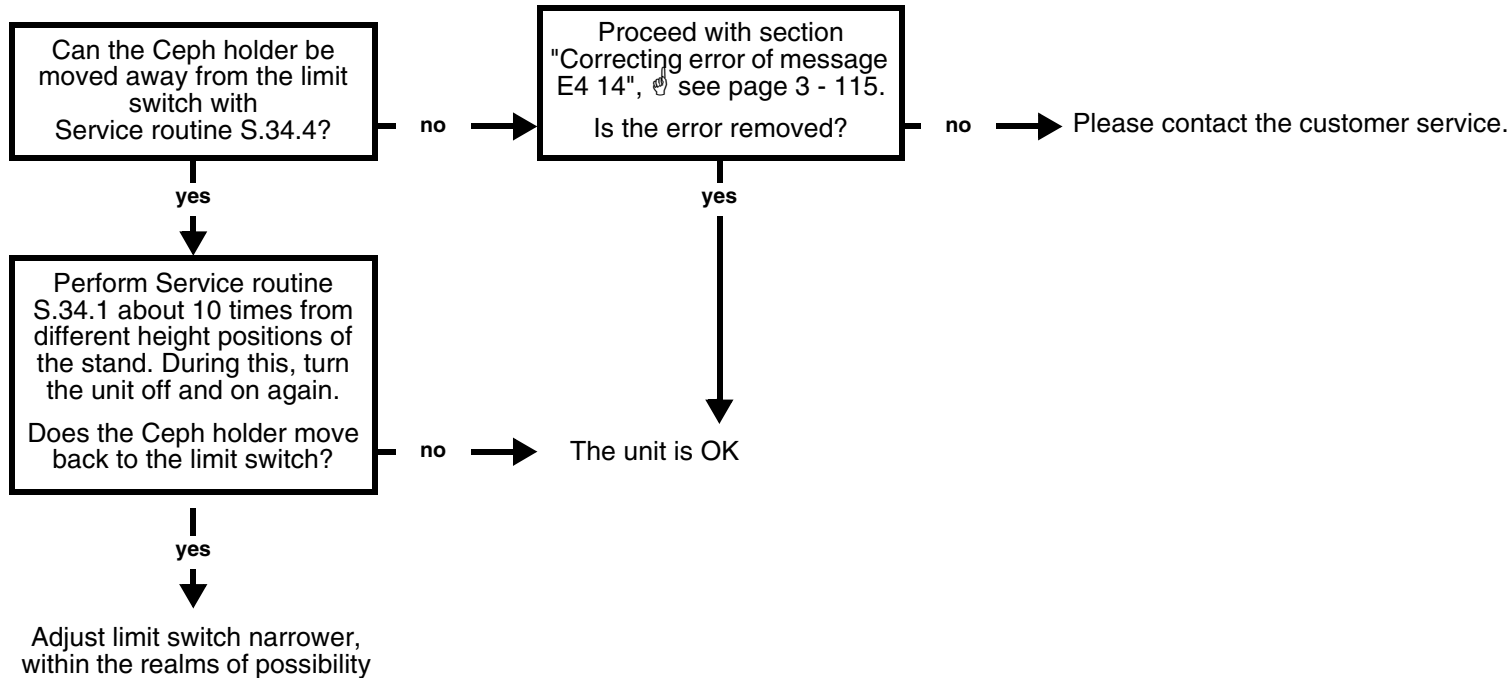
continued



### 3.45 Correcting error of message E4 14: Ceph holder not moving

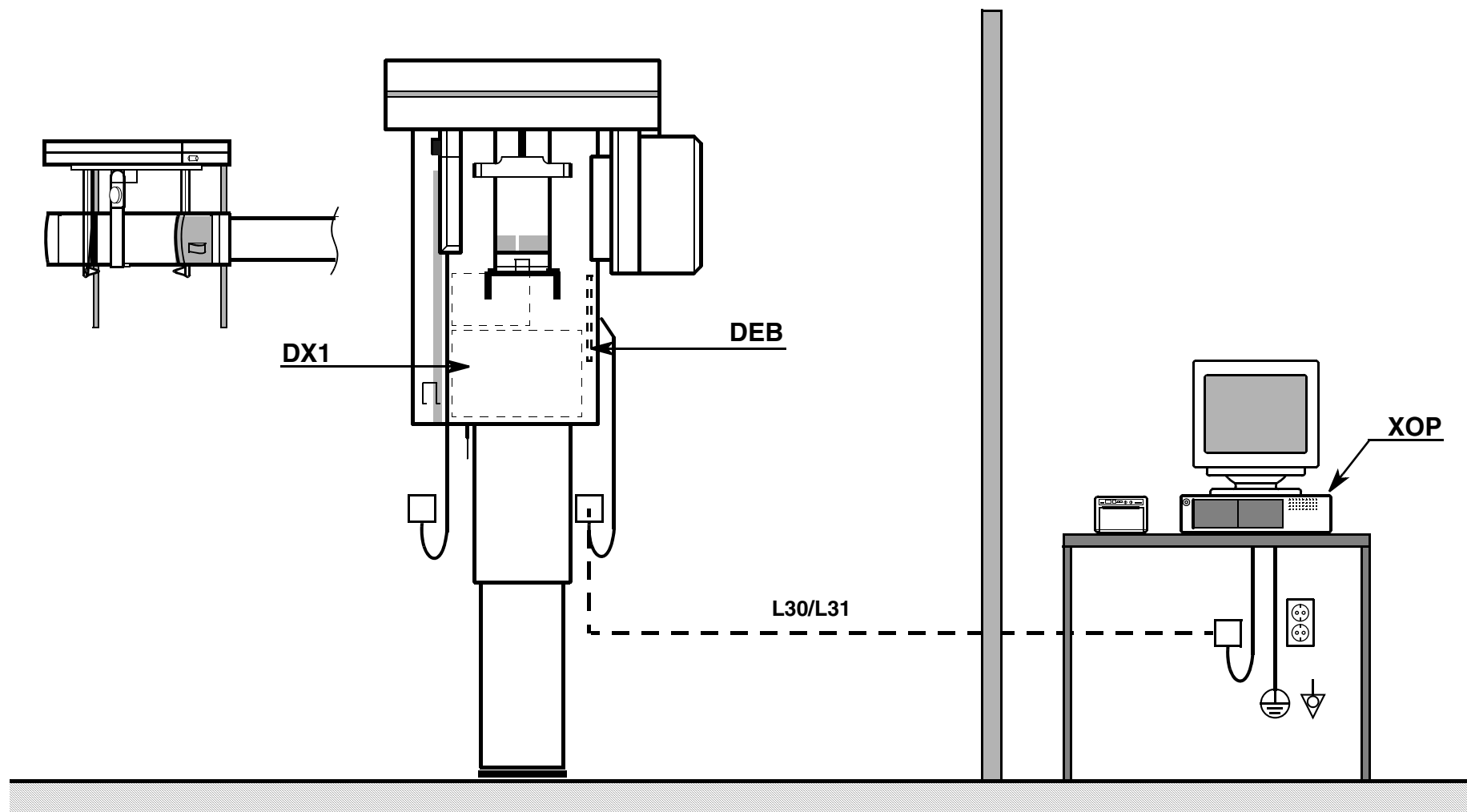


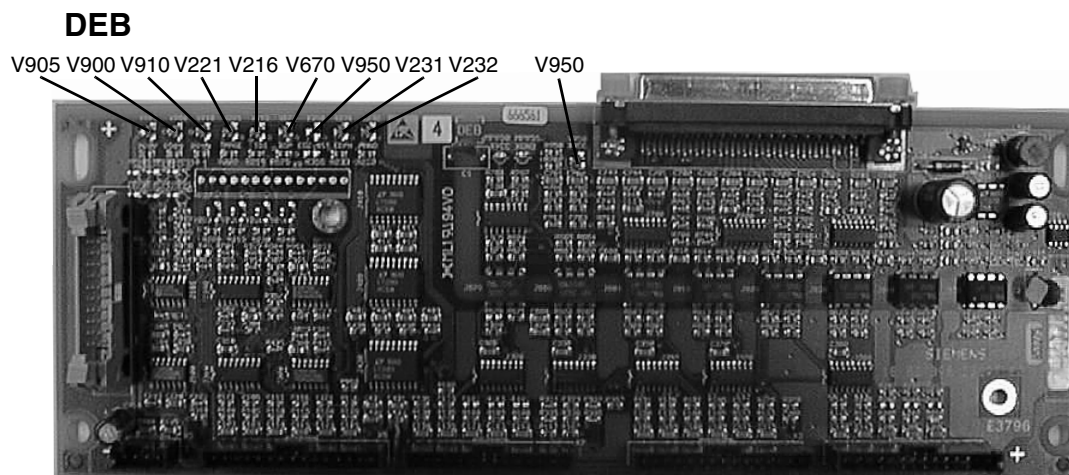
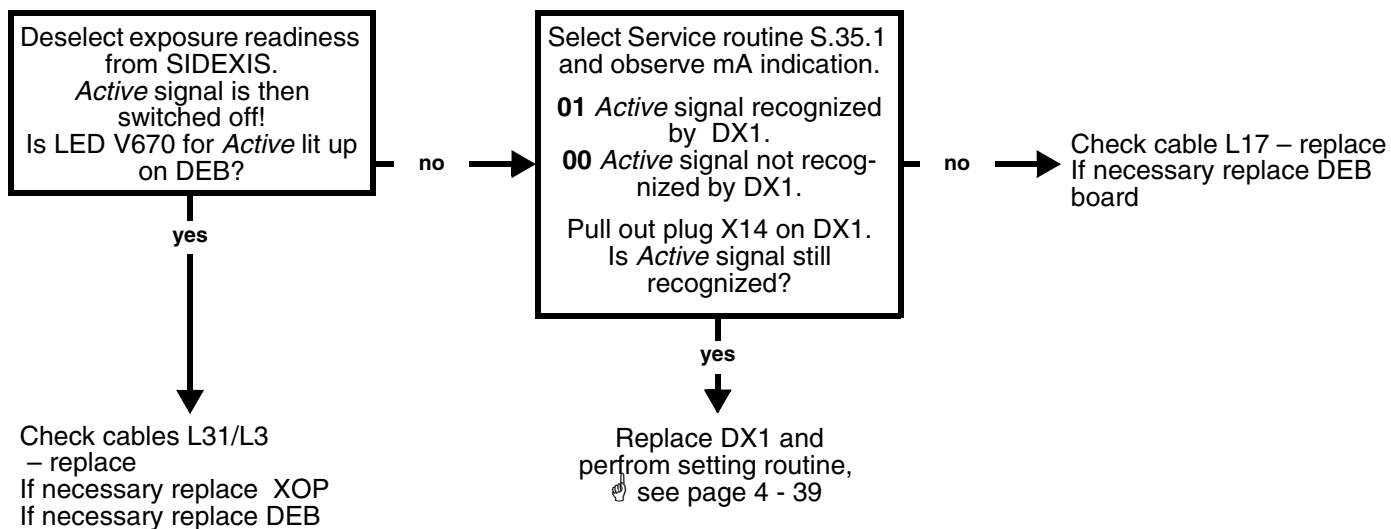
- Perform functional check of limit switches and replace or readjust, if necessary.



### 3.46 Correcting error of message E4 15: Ceph holder has not moved to the upper/lower limit switch.

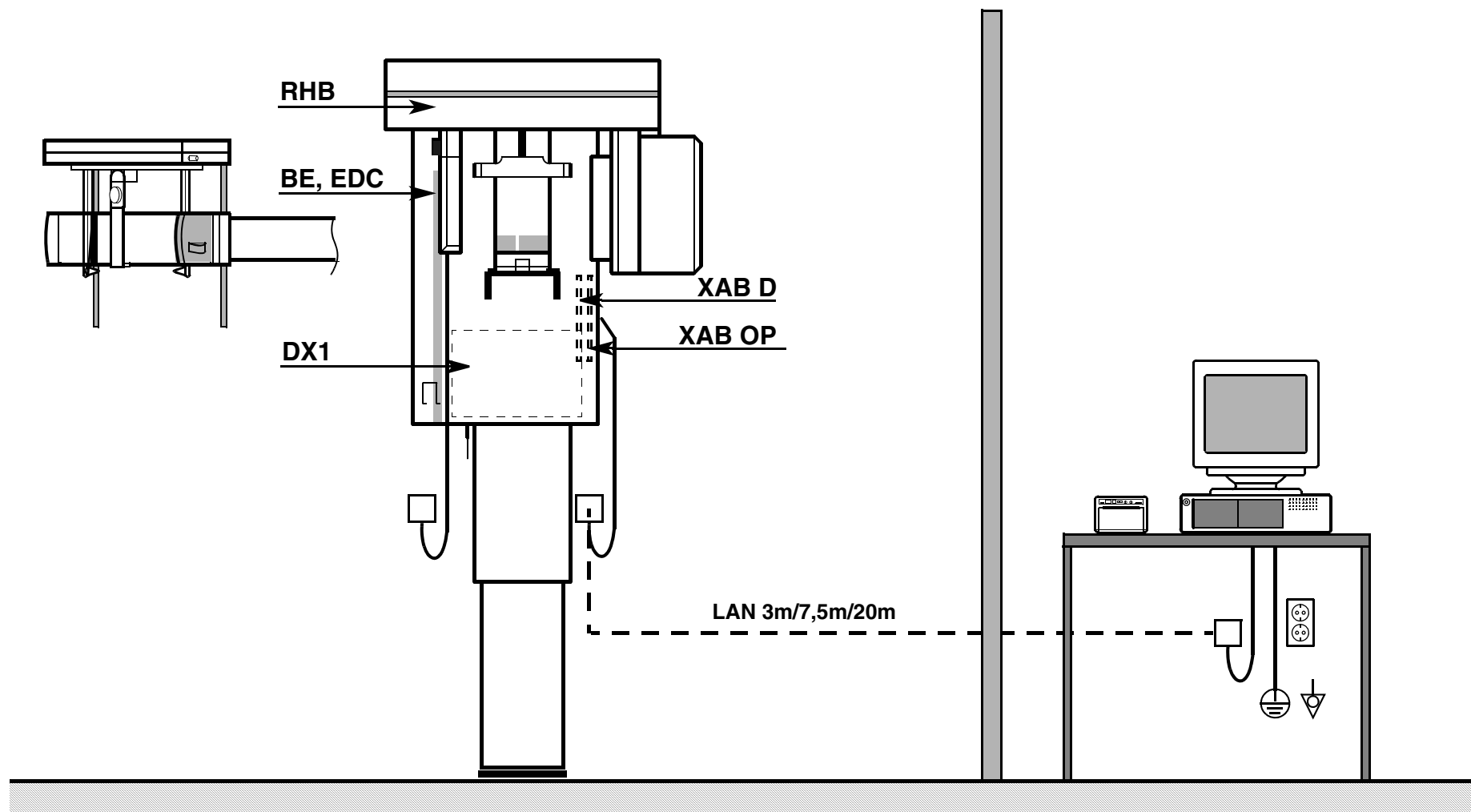
up to serial no. 1 999 ORTHOPHOS Plus DS  
51 999 ORTHOPHOS Plus DS Ceph

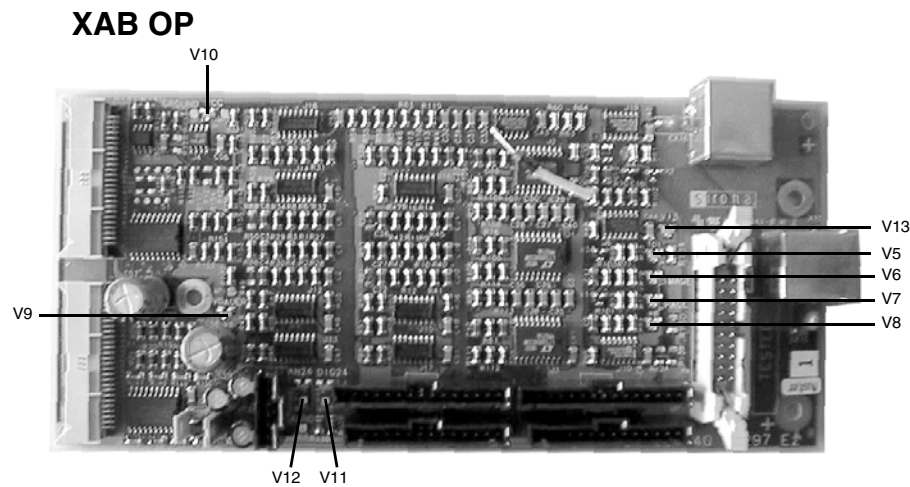
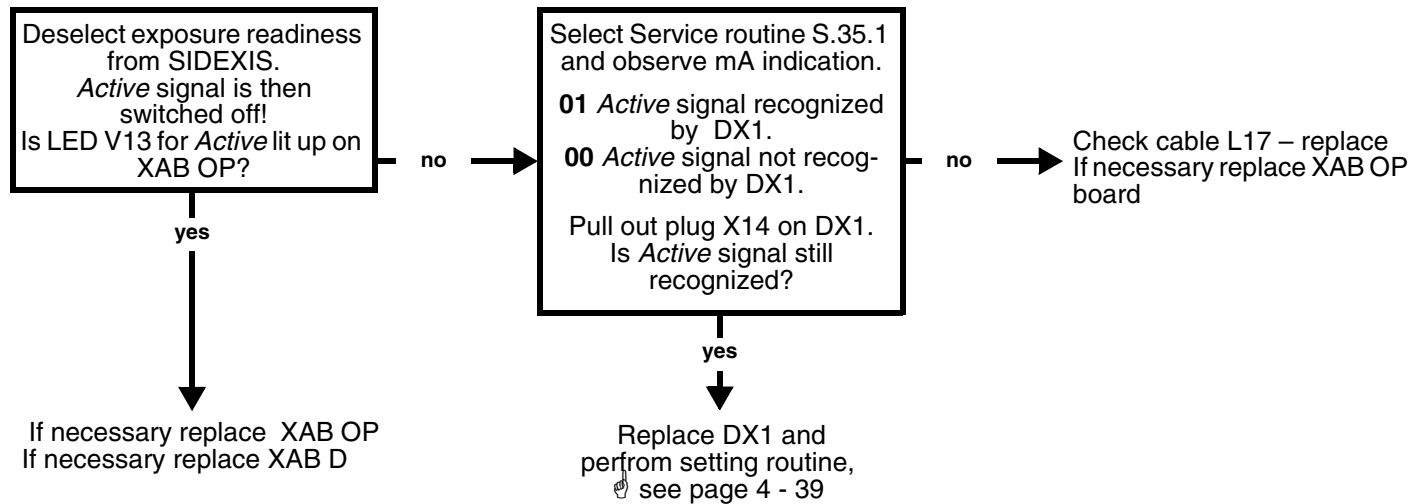




### 3.47 Correcting error of message E4 16: Active signal present when switching ON (with XOP)

from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph





### 3.48 Correcting error of message E4 16: Active signal present when switching ON (with XAB)





## **4 Checks and Adjustments**

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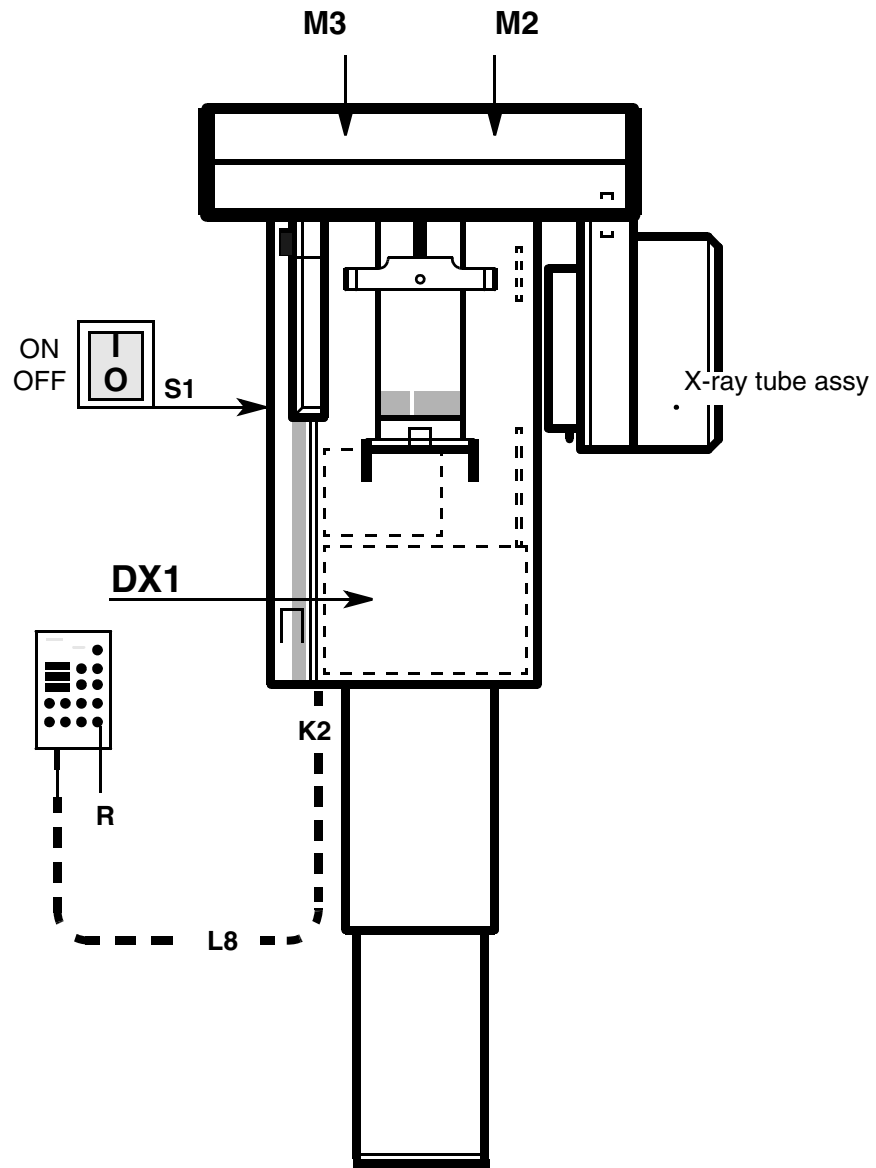
# Checks and Adjustments

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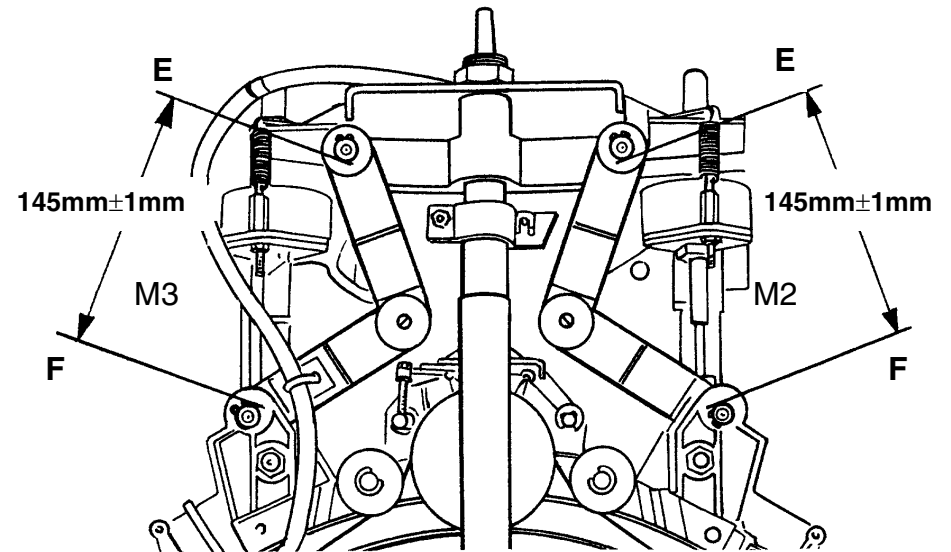
|      |                                                                                                 |        |
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| 4.16 | Change anomaly basic setting .....                                                              | 4 - 45 |





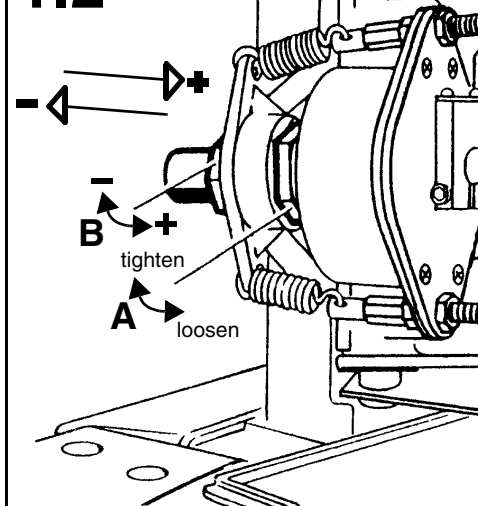
## 1.1

Top view of actuators M2/M3  
Panel removed



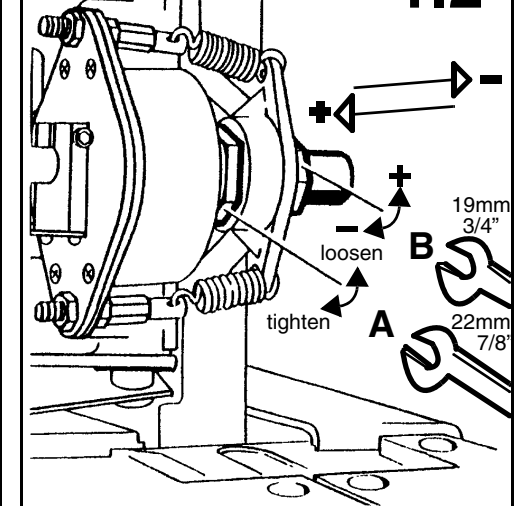
### Actuator M3

## 1.2



### Actuator M2

## 1.2



- Check once more whether the following points were observed when taking the phantom radiograph:
    - Needle phantom fully inserted.
    - Temple support fully closed.
    - Diaphragm wheel set to Panorama diaphragm 10 or 1.
    - Anomaly step 0 set (2nd LED from the left is lit).
    - Program P1 and lowest kV/mA preselected on Multitimer.
    - ORTHOPHOS Plus DS: SIDEXIS exposure readiness set for quality test exposure.
    - ORTHOPHOS 5/Plus: cassette inserted.
- Readjustment of the actuators is required if the specified pin distances on the phantom radiograph are not within the specified tolerance (see figure on next page).

### 1. Basic settings of actuators M2/M3:

Unscrew the cover from the carriage. Switch the unit on. The X-ray tube assembly is in the symmetry position.

#### 1.1 Measure the distance between axis A and F on M2/M3

(see Figure 1.1) The distance must be **145 mm ± 1 mm** (basic setting).

#### 1.2 If it is different: (see Figure 1.2)

Hold sleeve B with a wrench and loosen lock nut A.

Correct the distance with sleeve B\*.

When the distance of the axis is correct, hold sleeve B and secure it with locknut A.

\*  $\frac{1}{2}$  turn of the wrench results in 0.5 mm change in the distance.

### 2. Check the basic setting of the bite block

Move the X-ray tube assembly by hand to the 90° position and measure the symmetry distance S between the primary diaphragm and pin 5 (see Figure on the right).

Set the X-ray tube assembly manually to the 180° and 270° positions and measure the symmetry distance S.

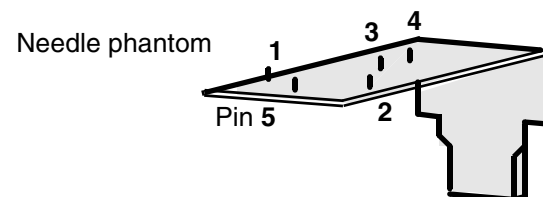
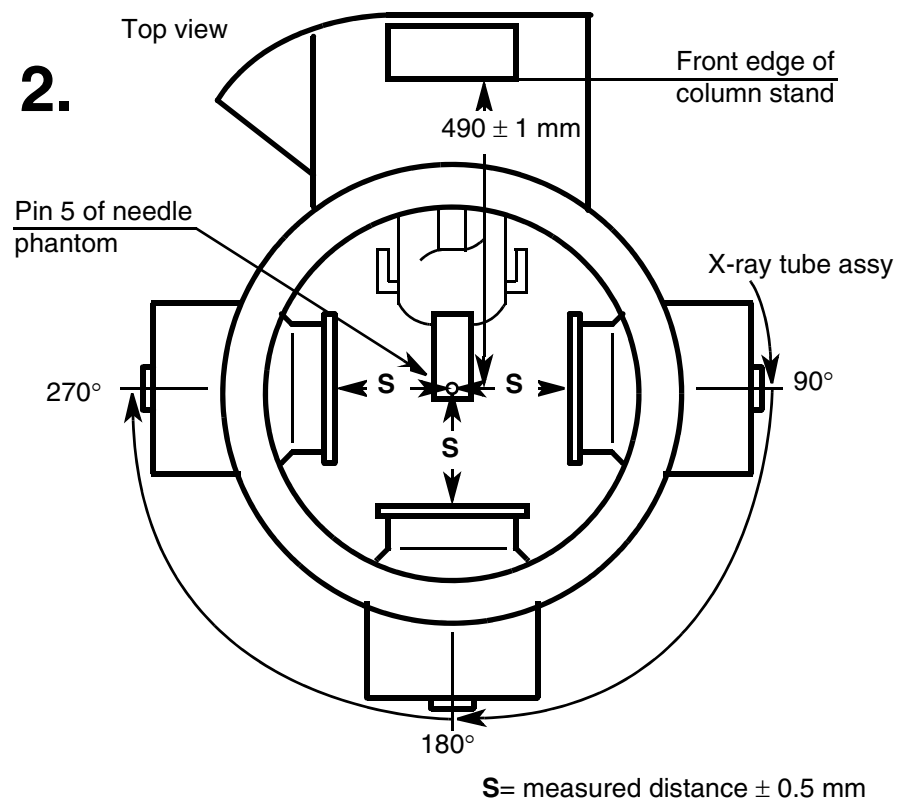
- All three symmetry distances **S** must be the same.  
Maximum permissible asymmetry: **±0.5 mm**.

### 3. Position of the X-ray beam

After performing the basic setting, you must check the position of the X-ray beam.

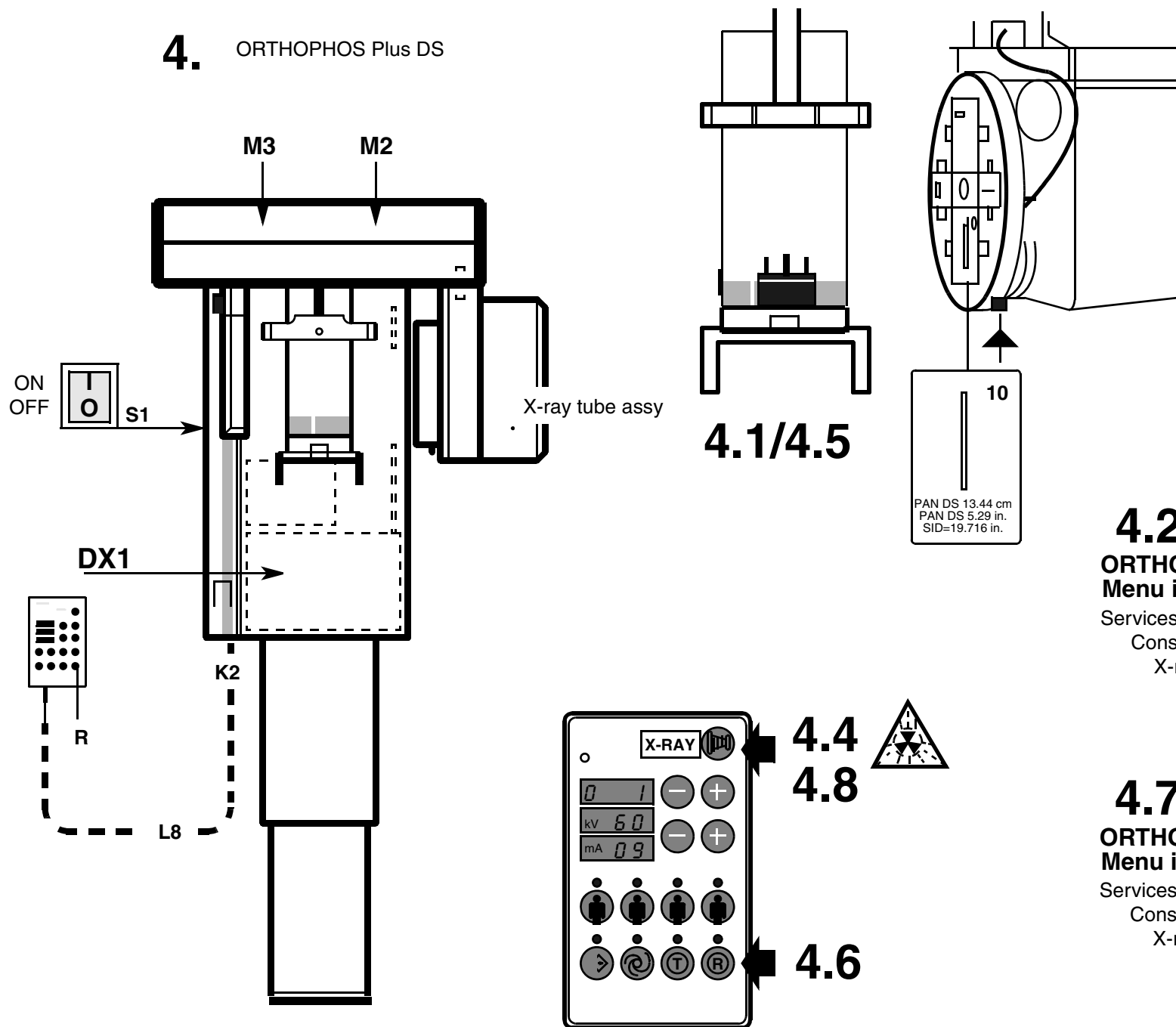
Proceed according to section 'Checking and adjusting the X-ray beam for Panorama exposure', see page 4 - 13.

**Continued on next page**



## 4.1 Phantom radiograph — Adjusting actuators M2/M3

## 4. ORTHOPHOS Plus DS



### 4.2 ORTHOPHOS Plus DS Menu in SIDEXIS

- Services →
- Constancy check →
  - X-ray operators →
  - Icons XC XP →
  - Service exposure →
  - Diaphragm adjustment (3)

### 4.7 ORTHOPHOS Plus DS Menu in SIDEXIS

- Services →
- Constancy check →
  - X-ray operators →
  - Icons XC XP →
  - Service exposure →
  - Quality test exposure (4)

Continued

#### 4. ORTHOPHOS Plus DS

##### 4.1 Prepare the phantom radiograph

- Set the diaphragm wheel to diaphragm 10.  
Move the X-ray tube assembly by hand to the 180° position.
- Insert the phantom supplied to its end position.  
Set 60kV/9mA and radiation time  $s = 0.1$  sec.

##### 4.2 In the **Services** menu click on **Constancy check**

Select **X-ray operators**, click icons **XC XP**

Select **Service exposure**

Activate **Diaphragm adjustment (3)**

##### 4.3 Exposure "through the center"

##### 4.4 Release an exposure. **CAUTION: RADIATION**

##### 4.5 Phantom radiograph: (X-ray beam must be adjusted)

##### 4.6 Press Return key R. The X-ray tube assembly travels to the start position.

##### 4.7 In the **Services** menu click on **Constancy check**

Select **X-ray operators**, click icons **XC XP**

Select **Service exposure**

Activate **Quality test exposure (4)**.

##### 4.8 **CAUTION: RADIATION!**

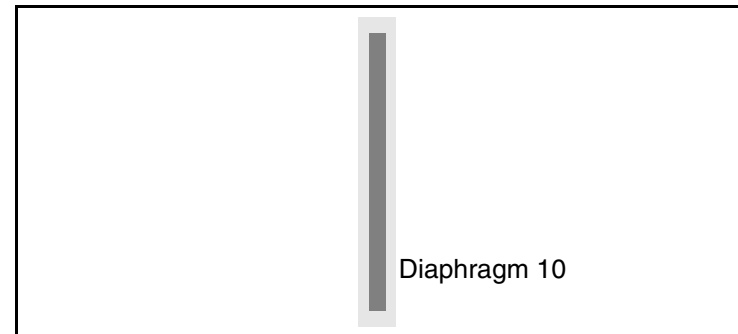
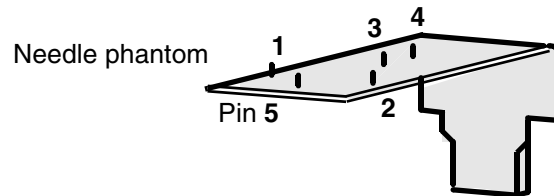
Release and exposure for one complete revolution of the rotating part.

##### 4.9 Evaluate the image on the screen (scale 1:2).

Measure the line spacing with **Length measurement** in the **Analysis** menu.

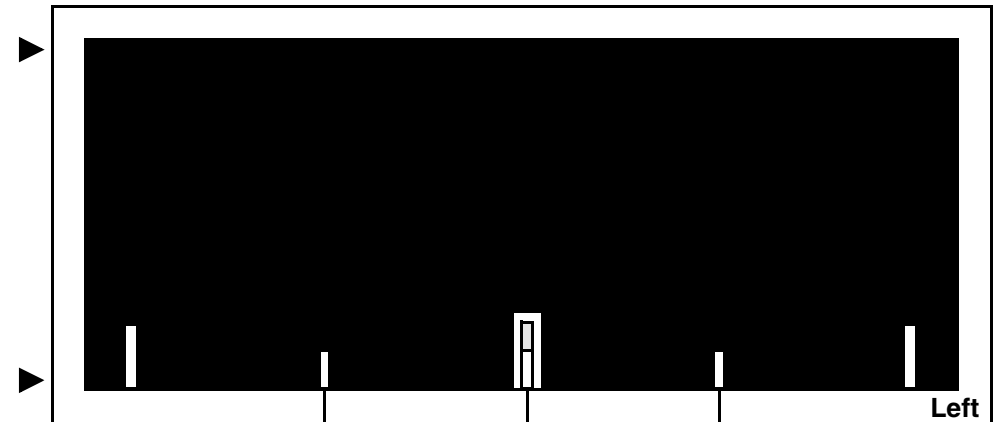
Use the mouse cursor to determine the start point for length measurement and drag the cursor to the end point with the left mouse button pressed.

Continued on next page



**4.3** correct

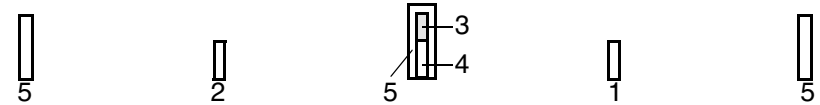
▼ Unexposed margin all around ▼



**4.9**

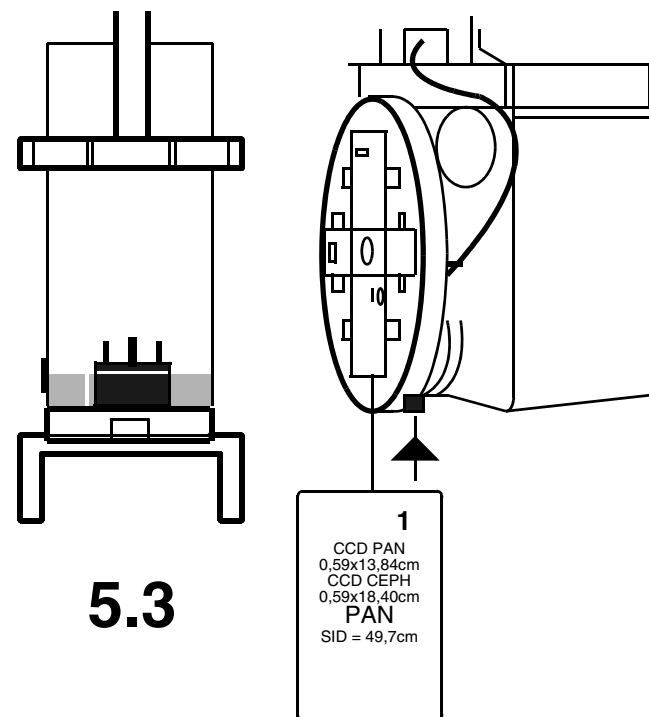
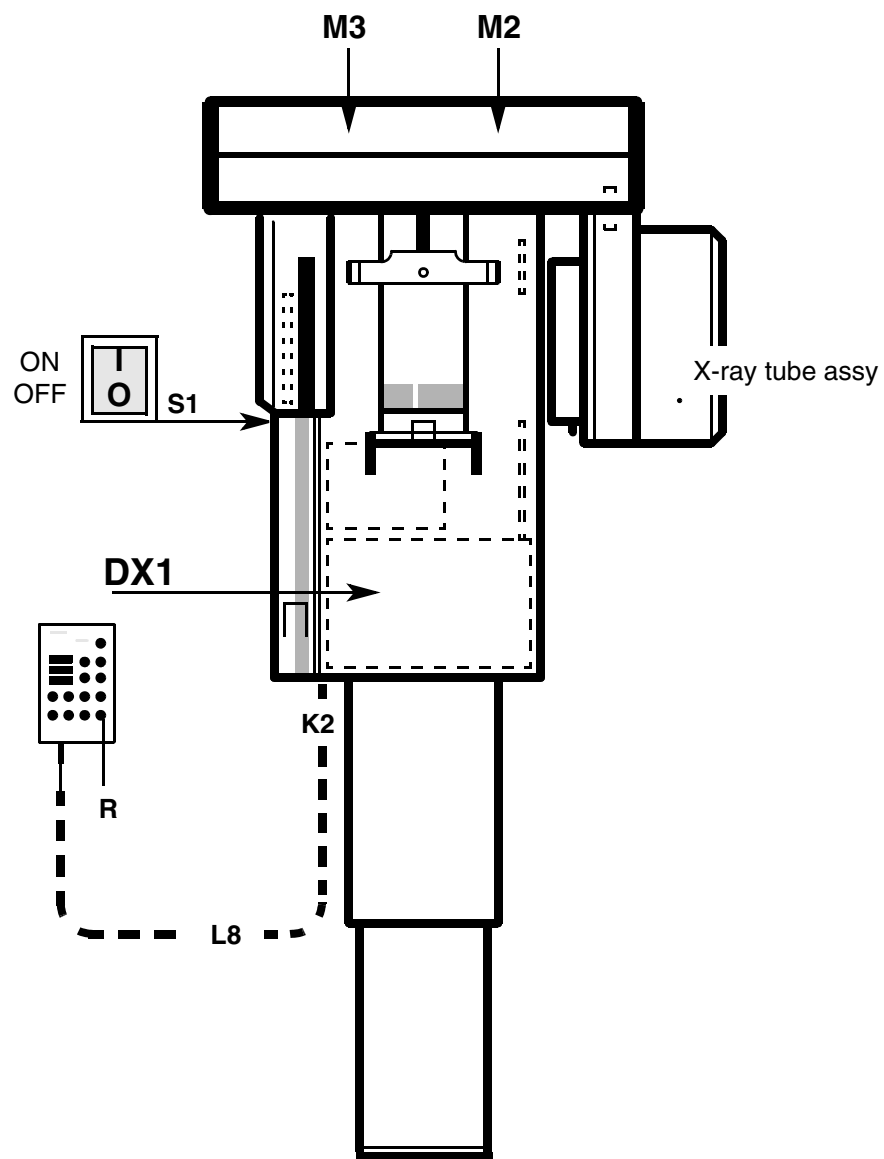
$a_1$   $a_2$   $a_1 = a_2 \pm 0.5\text{mm}$   
( $\pm 1/50''$ )

$b = 80\text{mm} \pm 1\text{mm}$   
 $3 \frac{1}{8}'' \pm 1/25''$



#### 4.1 Phantom radiograph - Adjusting actuators M2/M3

## 5. ORTHOPHOS 5/Plus



5.3



**Continued****5. ORTHOPHOS 5/Plus****5.1 Prepare the phantom radiograph**

- Set the diaphragm wheel to diaphragm 1. Anomaly step 0 set (2nd LED from the left is lit). With adhesive tape attach a 0.4 mm thick lead strip to the slot mark (contrast enhancement).  
NOTE: Use the 0.1 mm thick lead screen from an intraoral film and fold it twice in the longitudinal direction.
- Insert the phantom supplied to its end position.
- Place a non-exposed film in the cassette.
- Load the cassette in the cassette holder (see Operating Instructions).
- Swivel the cassette holder into position.
- Turn the unit on. Wait for the unit to execute the self-adjustment.

**5.2 Exposure "through the center"**




Move the X-ray tube assembly by hand to the **180°** position.

Select **Service routine S.02, test step 01** on the Multimer (see section 'Service routine S.02').

At the Multimer select 0.50 sec exposure time with the upper – + keys  
select 60kV/10mA at Fifo 20 with the lower – + keys  
select 61kV/7mA at Fifo 33 with the lower – + keys

Release an exposure. **CAUTION: RADIATION!**

**5.3 Panorama radiograph**

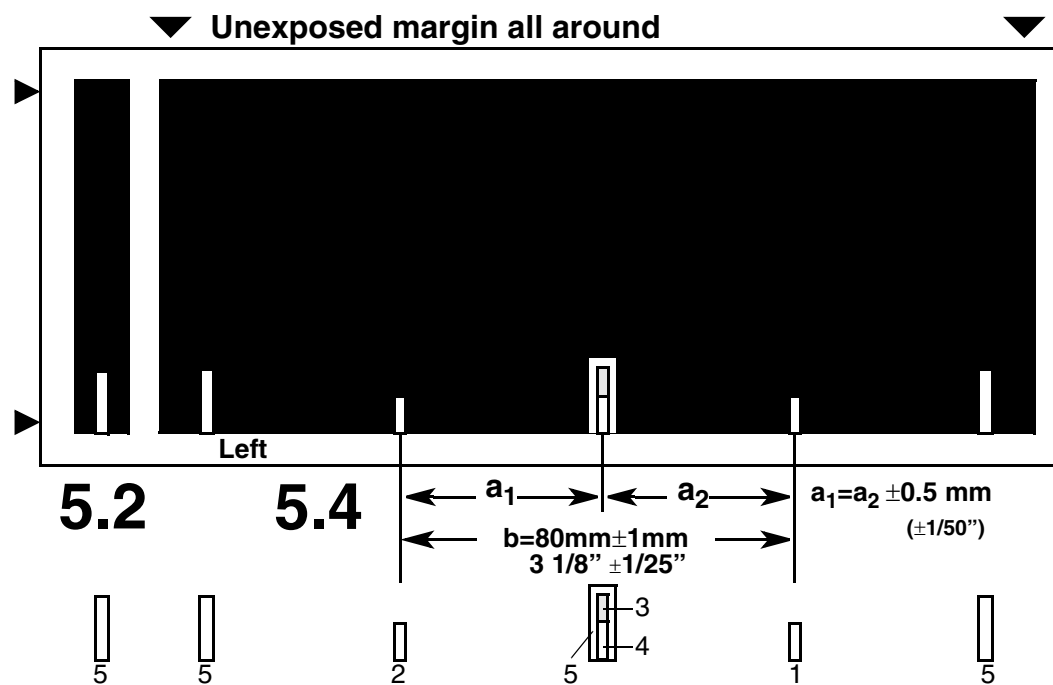
- Remove the lead strip from diaphragm 1.
- Press the Return key **R** on the cassette holder.  
The X-ray tube assembly travels to the start position.
- Deselect kV increase. (Press Memory key , LED above Memory key flashes. Press Program Display  key.  appears in display.
- Select program P1 and the lowest kV setting.
- Release an exposure for one complete rotation.

**CAUTION: RADIATION!**

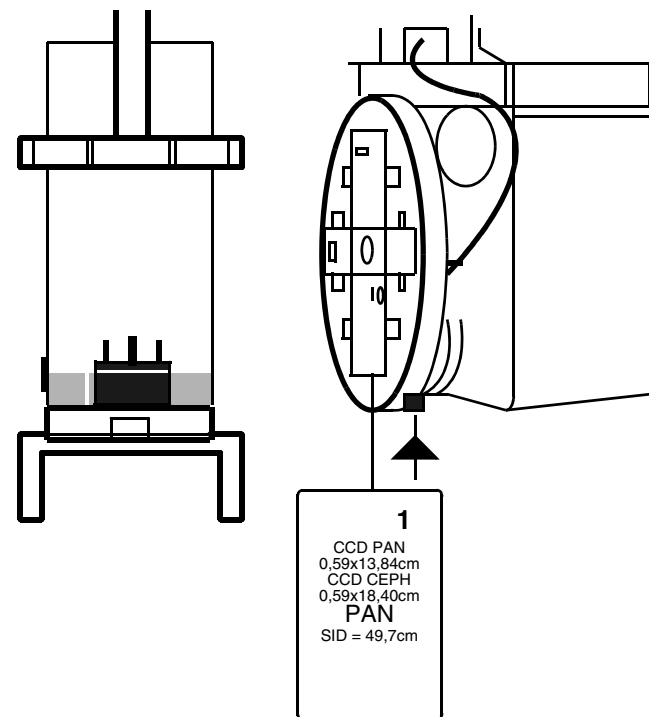
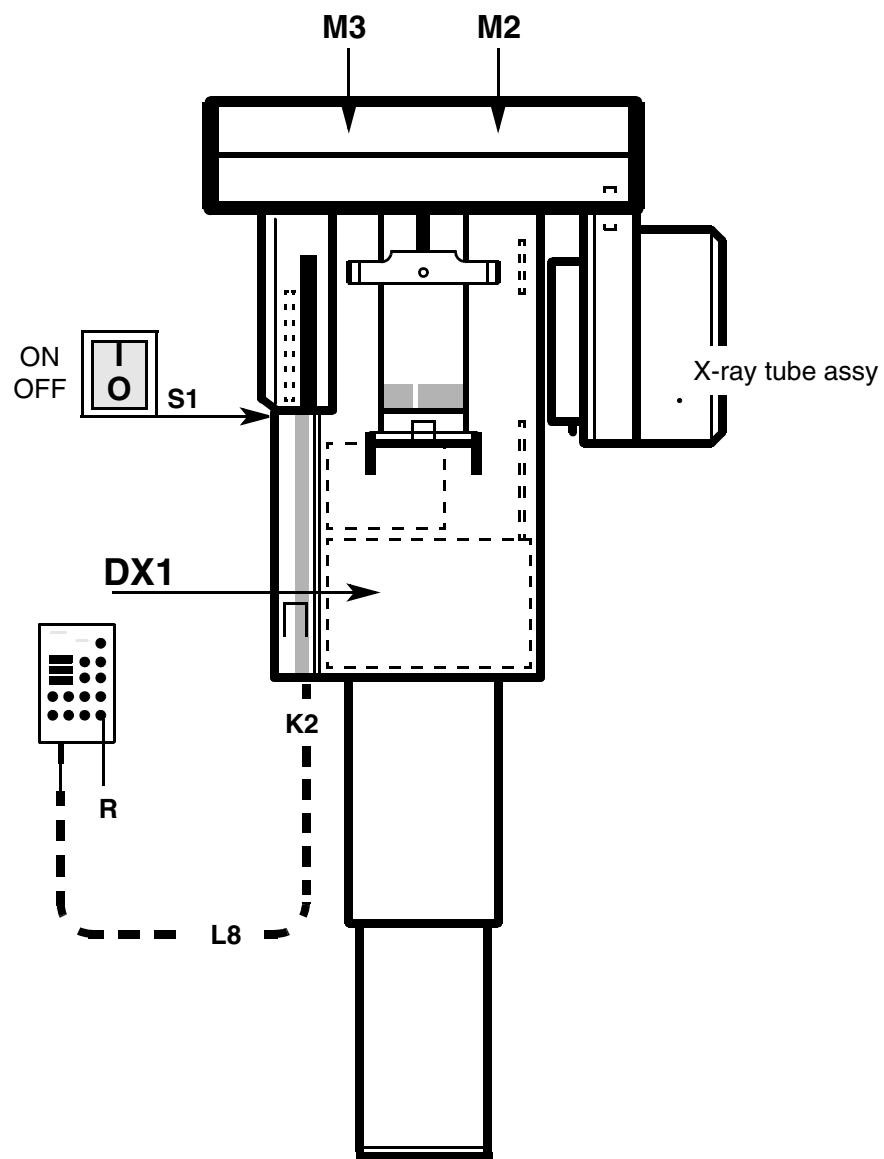
**5.4 Develop and evaluate the film.**

Watch for the unexposed margin. Pin 5 must appear within the exposed strip.

**Continued on next page**

**4.1 Phantom radiograph — Adjusting actuators M2 / M3**

## 5. ORTHOPHOS 5/Plus



## Continued

### 5.5 Otherwise, adjust the cassette holder K as follows:

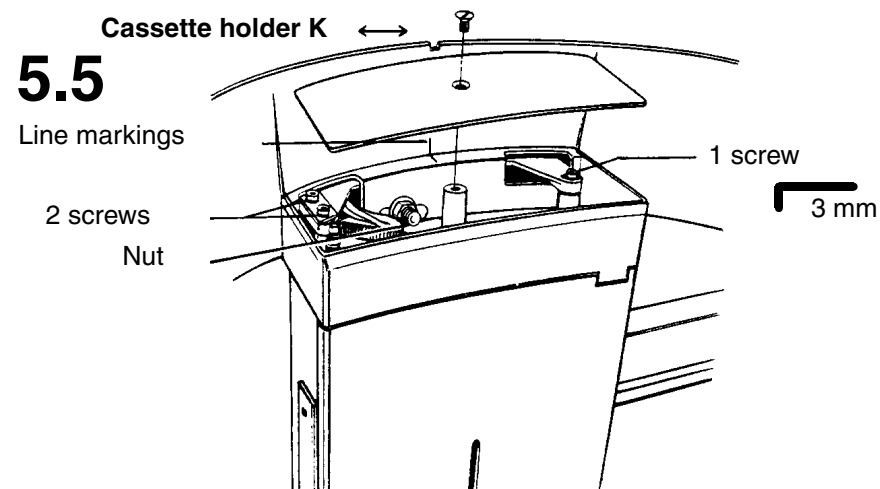
- Unscrew the cover.
- Attach two line markings.
- Loosen the nut and the three screws.
- Shift the cassette holder to the required position.  
Note: 1 mm deviation on the film requires 1 mm shift of cassette holder K.
- Pin appears too far left on the film: Move K to the right → .
- Pin appears too far right on the film: Move K to the left ← .

**Recheck:** Repeat the phantom radiograph as described above.  
Pin 5 must appear within the exposed strip.

Panorama radiograph

Evaluate the unexposed margin around the edge.

Line distances **b** and **a<sub>1</sub> / a<sub>2</sub>** must be within the specified tolerance.



## 6. ORTHOPHOS Plus DS and ORTHOPHOS 5/Plus

### 6.1 Correction by fine adjustment of actuators M2/M3

#### General adjustment:

Hold sleeve **B** with a wrench and loosen locknut **A**. Make the correction with sleeve **B**, hold it and secure it with locknut **A**.

#### Rule for distance **b**:

**1 mm change on the screen/film corresponds to 0.5 mm shift of the actuator**  
(~ 1/2 turn of the wrench).

**b > 81 mm:** Adjust actuators M2 and M3 equally to +.

**b < 79 mm:** Adjust actuators M2 and M3 equally to -.

#### Rule for distances **a<sub>1</sub>** and **a<sub>2</sub>**:

**1 mm difference between **a<sub>1</sub>** and **a<sub>2</sub>** on the screen/film corresponds to 0.3 mm shift of the actuator** (~ 1/3 turn of the wrench).

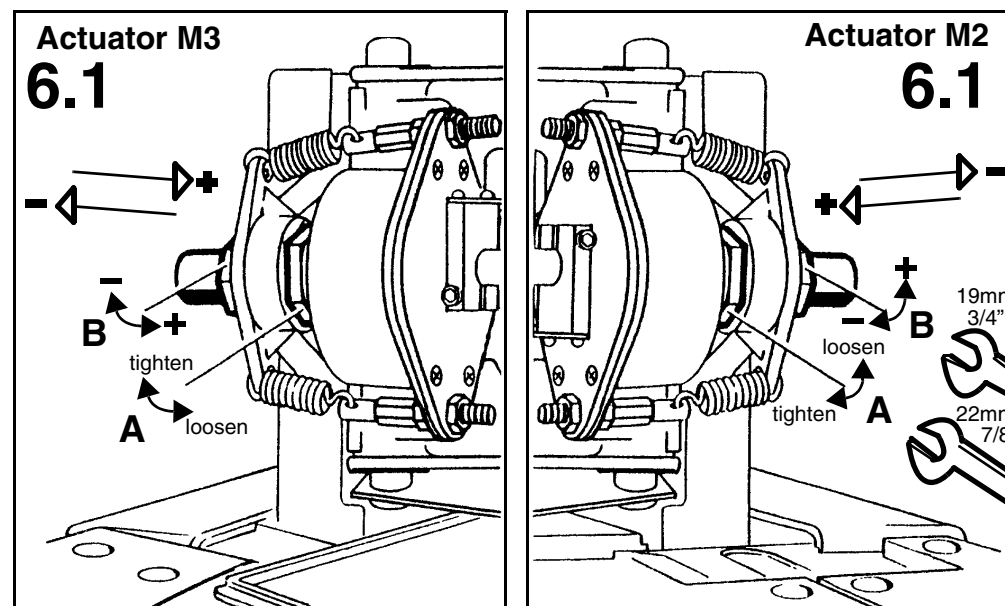
If **a<sub>1</sub> < a<sub>2</sub>**: shorter pin 4 is shown to the right of pin 3.

Uniformly adjust the sleeve to + at M2 and to - at M3.

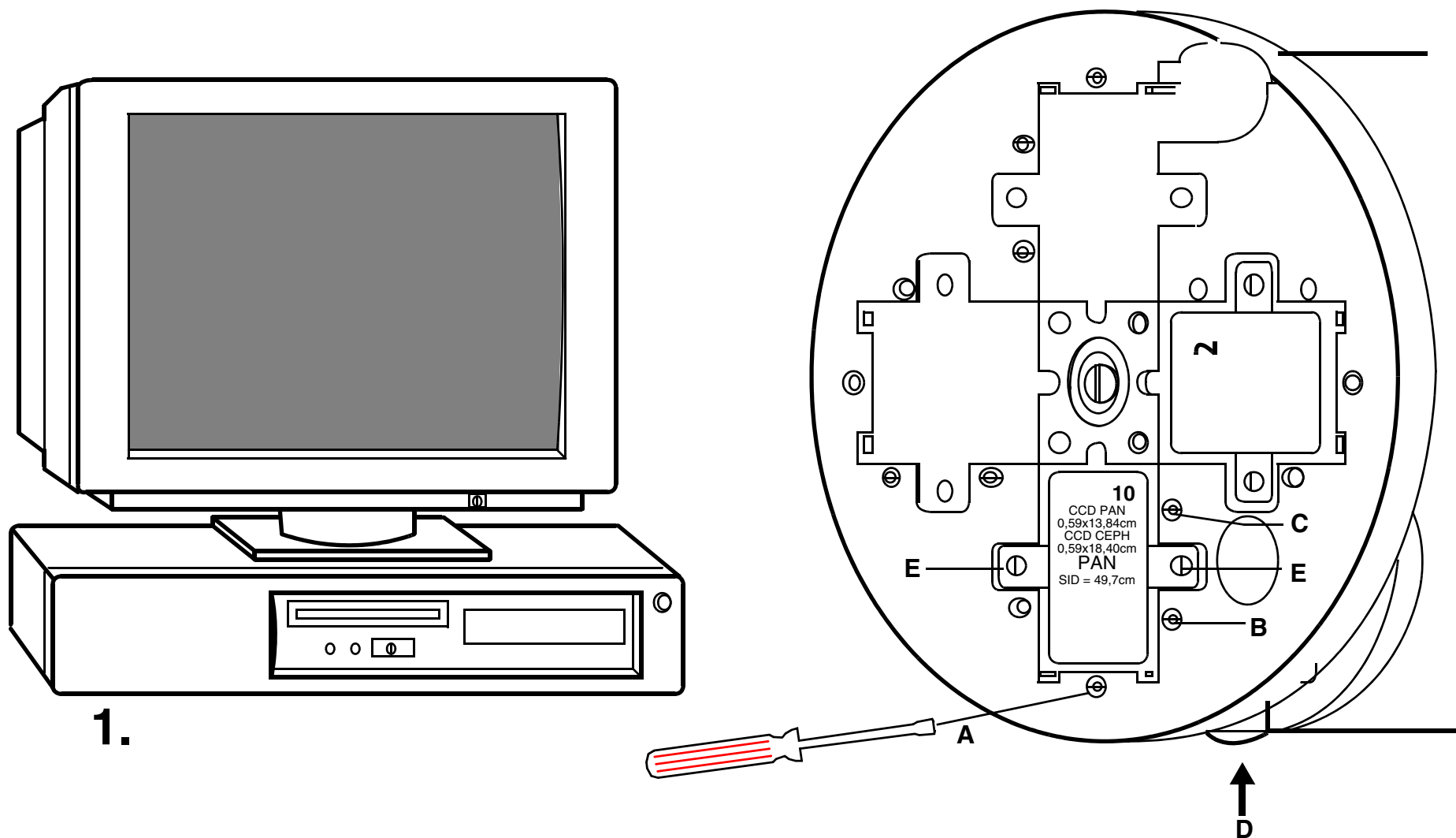
If **a<sub>1</sub> > a<sub>2</sub>**: shorter pin 4 is shown to the left of pin 3.

Uniformly adjust sleeve to - at M2 and to + at M3.

**Check:** Repeat the Panorama radiograph.



## 4.1 Phantom radiograph — Adjusting actuators M2 / M3



### ORTHOPHOS Plus DS

- Adjust primary diaphragms 10 and 2 successively on the diaphragm wheel.
- Press locking button **D** to adjust the diaphragm wheel.  
Radiation is generated only if button **D** is correctly engaged.

#### 1. Establish exposure readiness:

in the **Service** menu click on **Constancy check**

Select **X-ray operators**, click icons **XC XP**

Select **Service password** (see SIDEXIS Service Manual)

Select **Service exposure**

Activate **Diaphragm adjustment (3)**.

#### 2. Generate RADIATION.

The beam must appear (horizontally and vertically) in the center of the diaphragm display on the screen).

NOTE: If the beam is not visible on the screen:

Set exposure readiness, set radiation time = 0.1 sec,  
60kV/09mA, set diaphragm diagonally, release **RADIATION**,  
adjust position of the beam to the center.

#### X "High-Low" beam correction

Loosen two screws **E** by one turn each.

Make the beam correction with the screw (eccentrics).

Retighten screws **E**.

#### Y "Vertical" beam correction and

#### Z 'Right-left' beam correction

Loosen two screws **E** by one turn each.

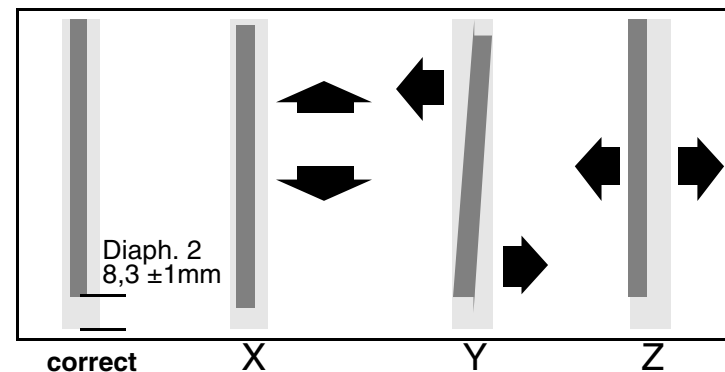
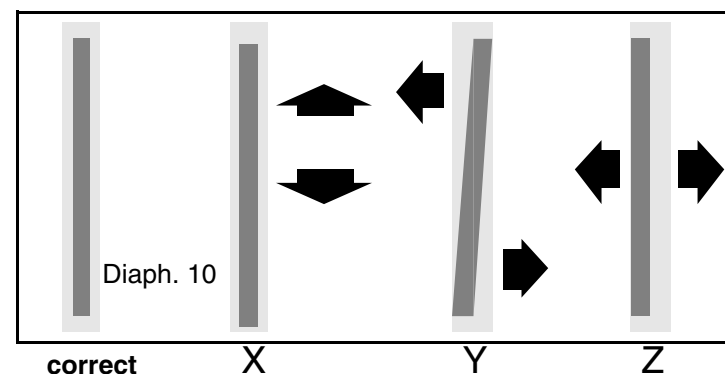
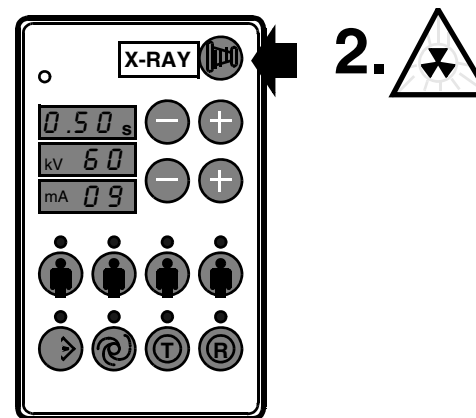
Make the beam correction with the screw (eccentrics).

Retighten screws **E**.

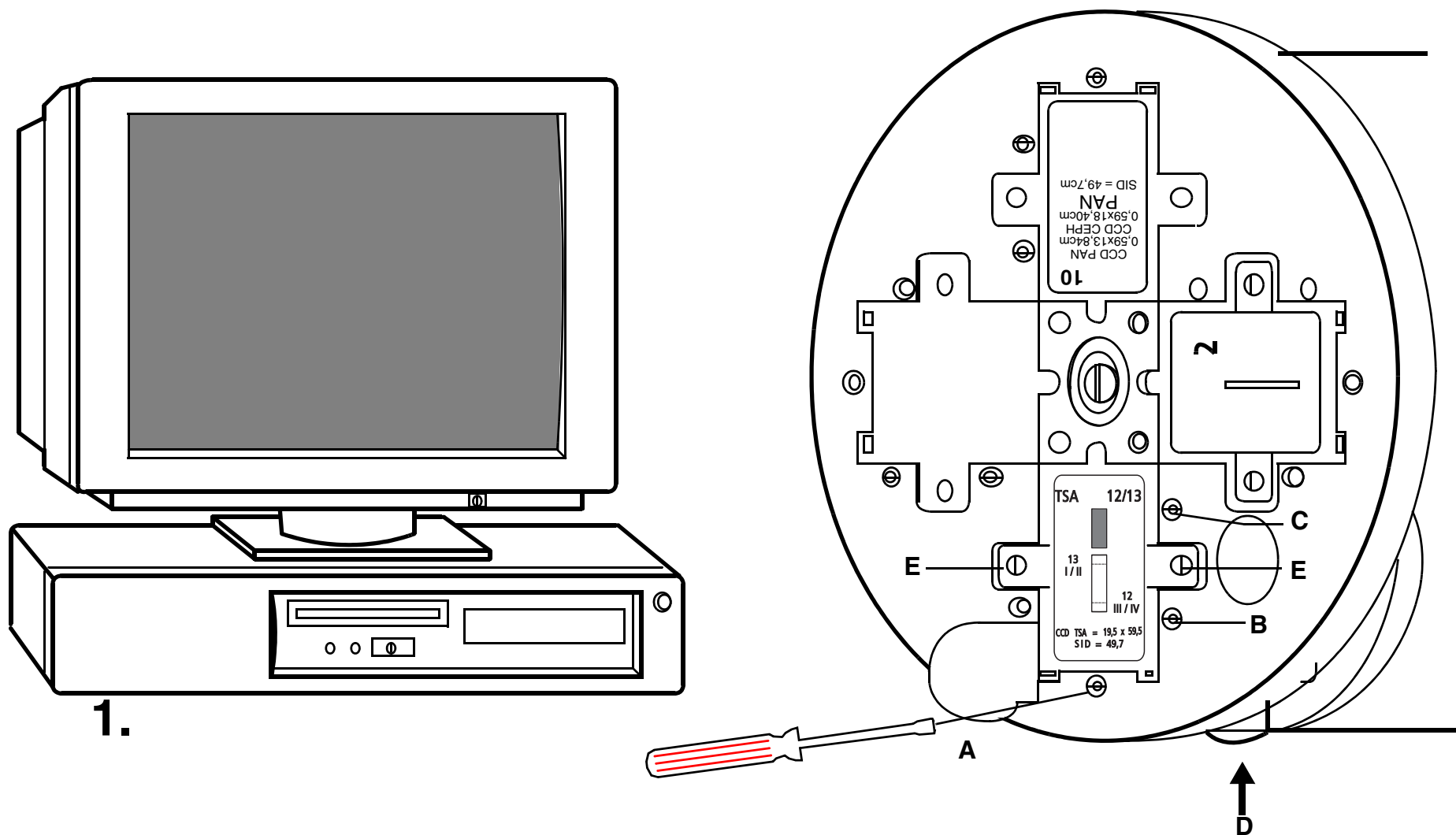
Final check of the beam position is done in section **Phantom radiograph**, see page 4 - 5.

- Close diaphragm displays  
( [Strg]+[F4] ).

**Continued on next page**



## 4.2 Checking and adjusting the X-ray beam for panorama radiograph



**For ORTHOPHOS Plus DS TSA**

- Adjust primary diaphragm 12/13 (TSA slot) with the diaphragm wheel.
- Press locking button **D** to adjust the diaphragm wheel.  
Radiation is generated only if button **D** is correctly engaged.
- Select diaphragm 12 (yellow, mandible).

**1. Establish exposure readiness:**

in the **Service** menu click on **Constancy check**

Select **X-ray operators**, click icons **XC XP**

**Service password** (see SIDEXIS Service Manual)

Select **Service exposure**

Activate **Diaphragm adjustment (3)**.

**2. Generate RADIATION.**

The beam must appear (horizontally and vertically) in the center of the diaphragm display on the screen).

NOTE: If the adjustment range is inadequate or the diaphragm assumes a slanted position, loosen the screw in the elongated hole of the pin sliding mechanism (on back side of diaphragm) and displace it slightly.

**X "High-Low" beam correction**

Loosen two screws **E** by one turn each.

Make the beam correction with the screw (eccentrics).

Retighten screws **E**.

**Y "Vertical" beam correction and****Z 'Right-left' beam correction**

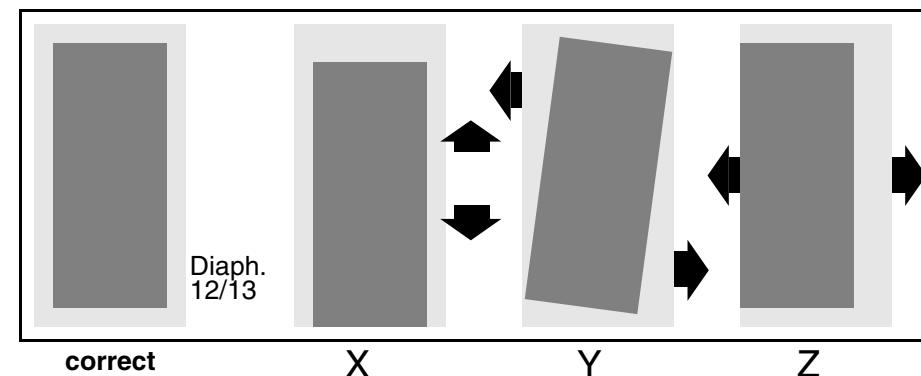
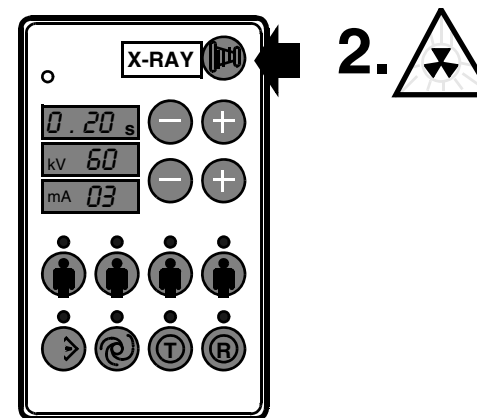
Loosen two screws **E** by one turn each.

Make the beam correction with the screw (eccentrics).

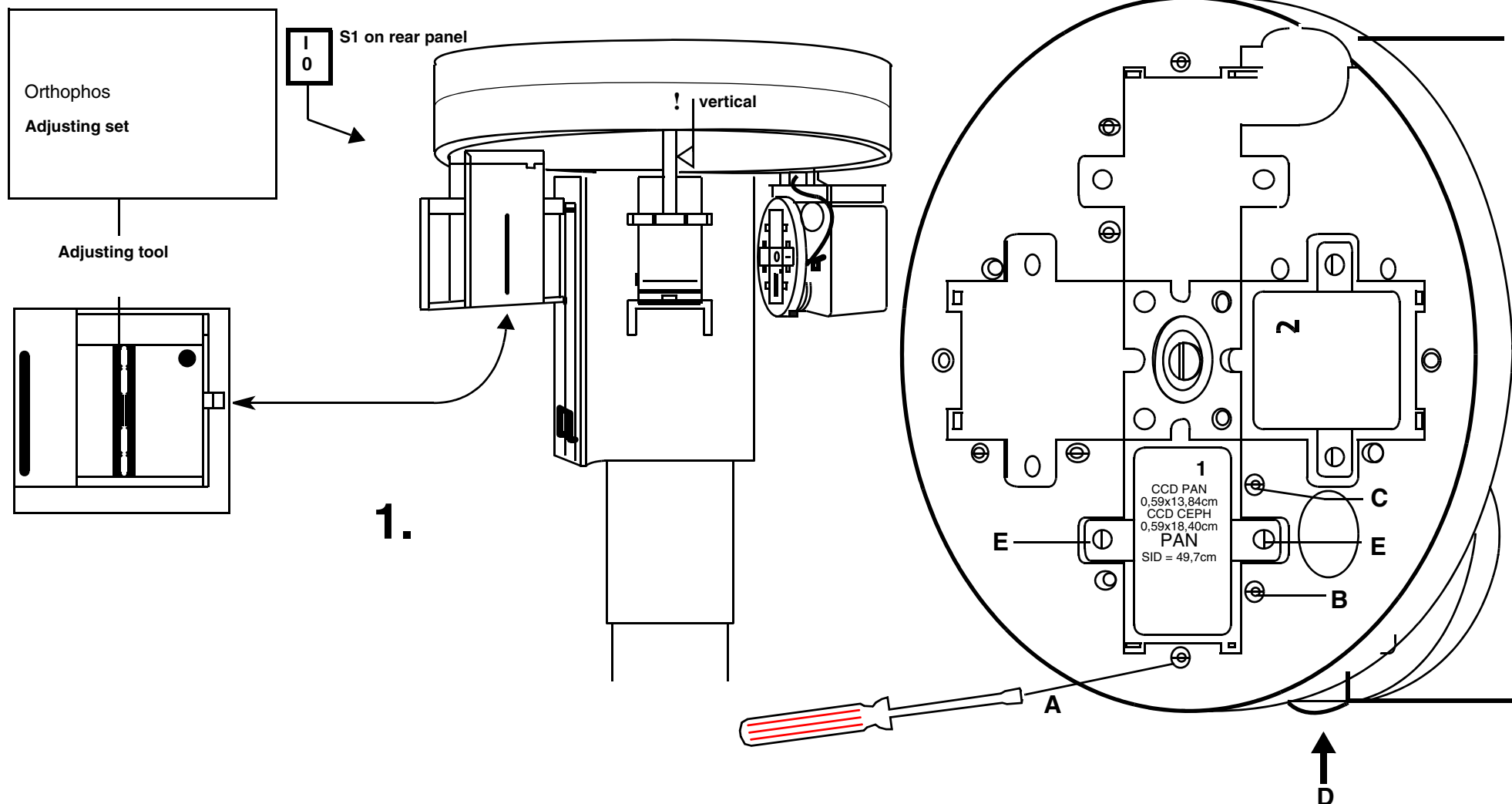
Retighten screws **E**.

- Select diaphragm 13 (blue, maxilla) and repeat the above procedure.
- The adjustments of the mandible and the maxilla influence each other. For this reason, these adjustments must be mutually checked and readjusted if necessary.
- Close diaphragm displays  
( [Strg]+[F4] ).

Continued on next page



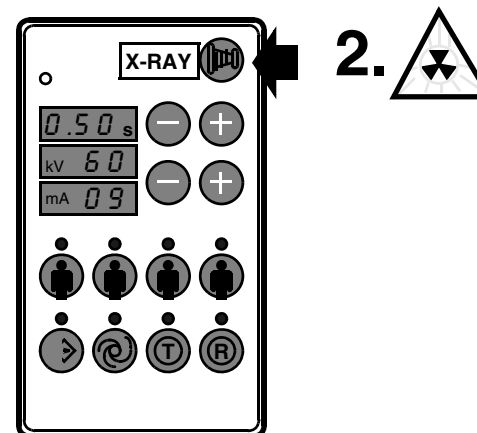
## 4.2 Checking and adjusting the X-ray beam for panorama radiograph





### ORTHOPHOS 5/Plus

1. Insert the **adjusting tool** vertically into the cassette carriage and slide it behind the secondary diaphragm.  
Actuate main switch **S1** on the rear panel of the carriage.  
Several radiographic parameters light up on the Multitimer (see Operating Instructions).  
Darken the room.
  - Adjust primary diaphragms 1 and 2 successively on the diaphragm wheel.
  - Press locking button **D** to adjust the diaphragm wheel.  
Radiation will be generated only if button **D** is correctly engaged
  - When adjusting the primary diaphragm 1 and 2, position the beam to the indicated marks.
  - Select Service routine S.01.
2. **Generate RADIATION.**  
**Release radiation only for the time necessary to recognize the beam position.**



#### X "High-Low" beam correction

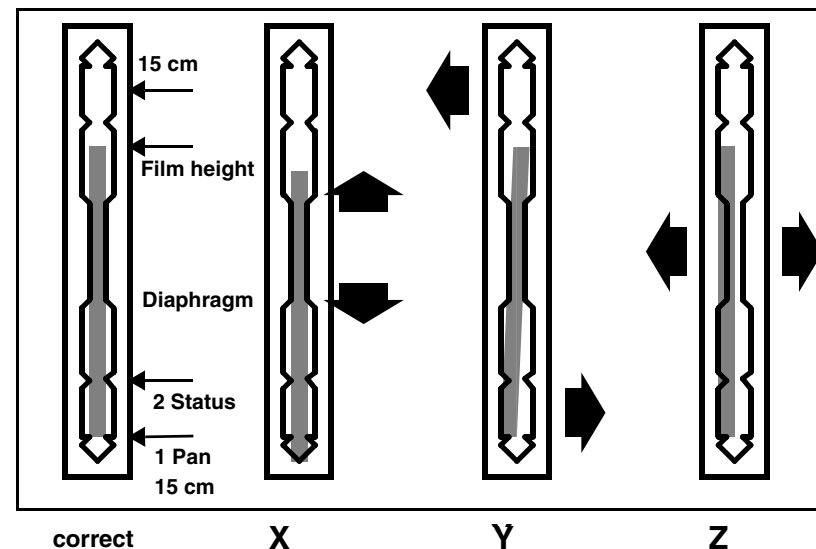
Loosen two screws **E** by one turn each.  
Make the beam correction with screw A (eccentric).  
Retighten screw **E**.

#### Y "Vertical" beam correction and

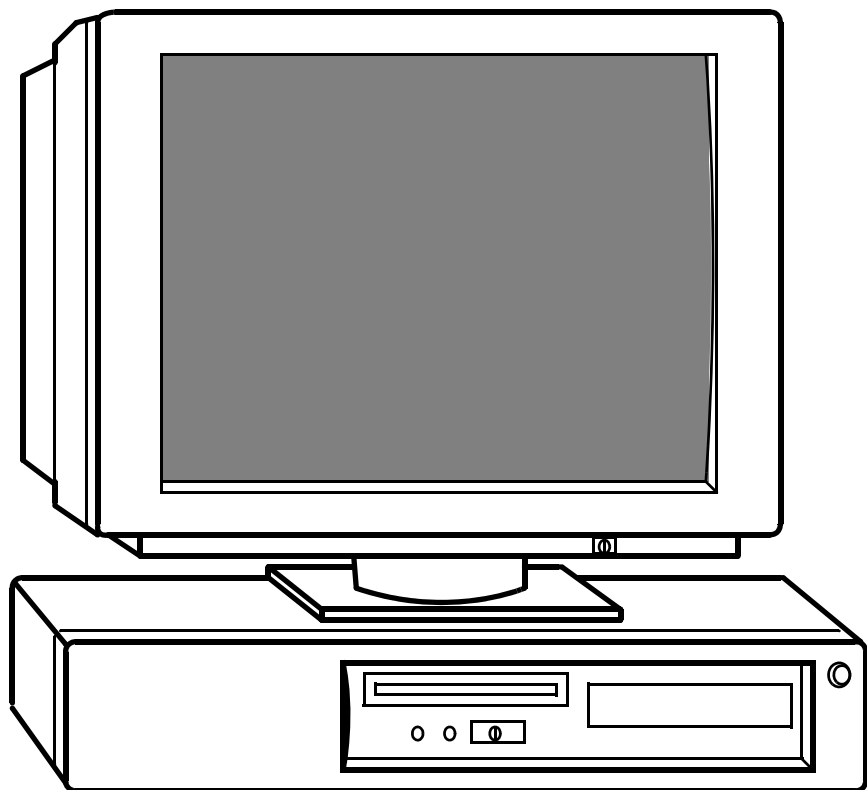
#### Z "Right-Left" beam correction

Loosen two screws **E** one turn each.  
Make the beam correction with screws B and C (eccentrics).  
Retighten screws **E**.

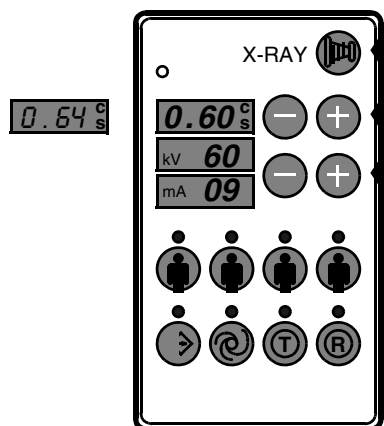
- Final check of the beam position is done in section **Phantom radiograph**, see page 4 - 5.



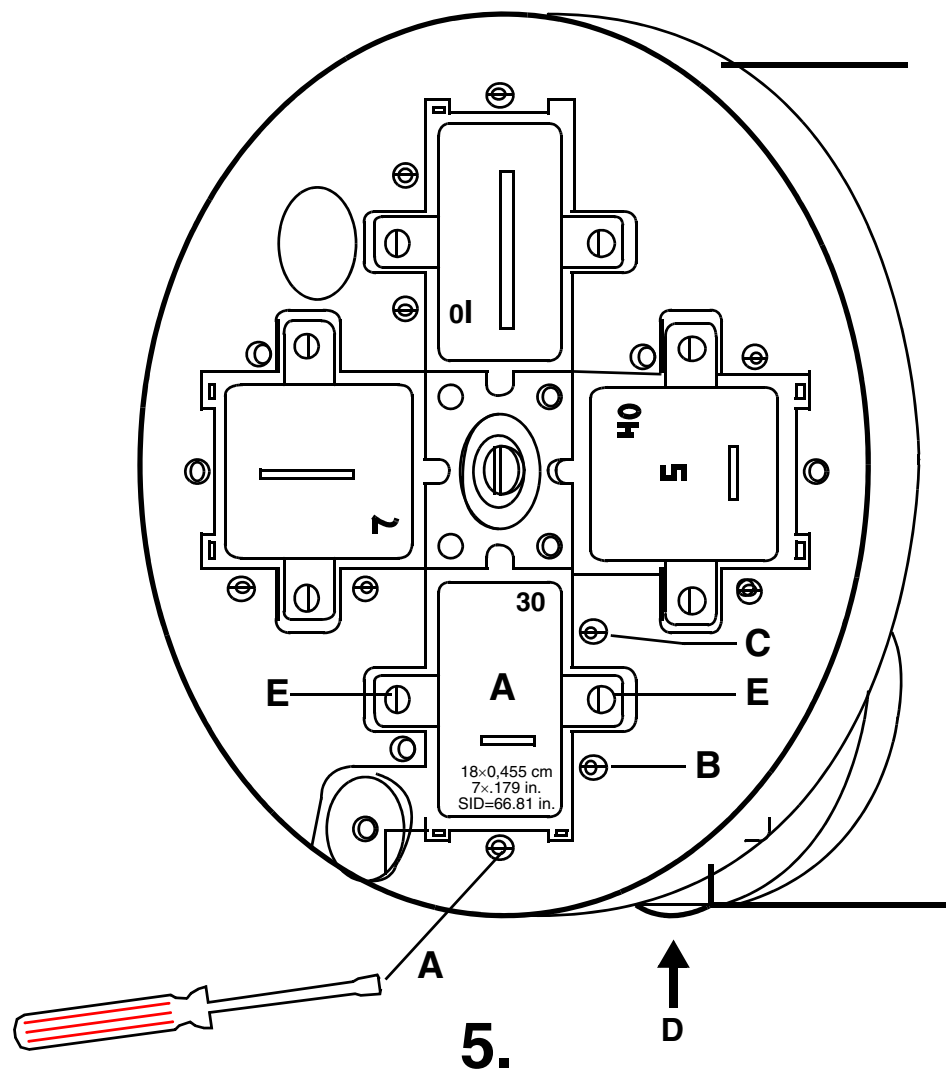
## 4.2 Checking and adjusting the X-ray beam for Panorama radiography



1.




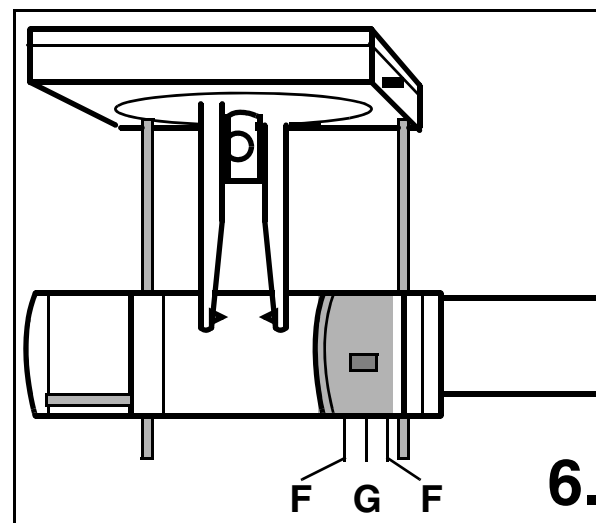
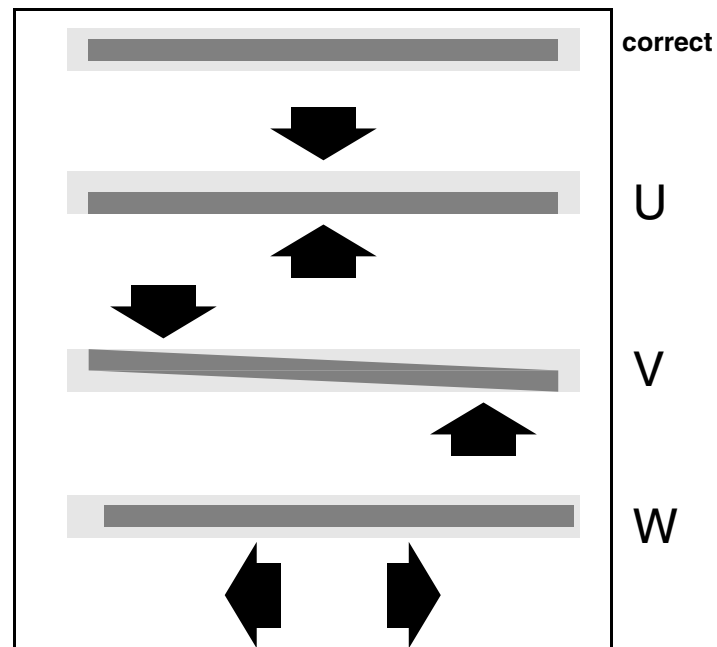
4.  
2.  
3.



5.

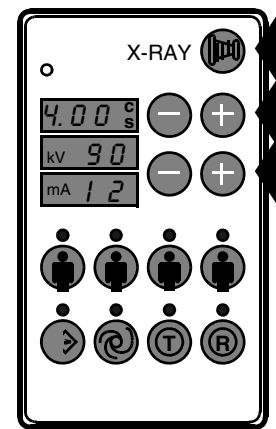
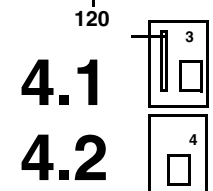
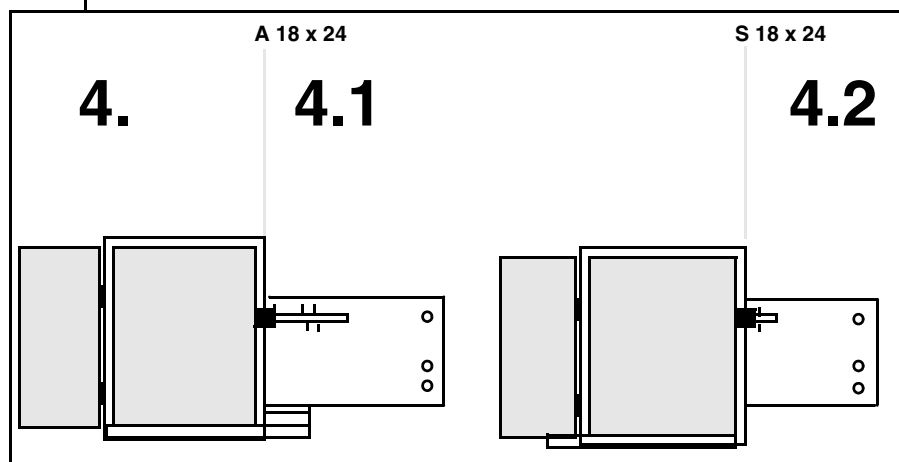
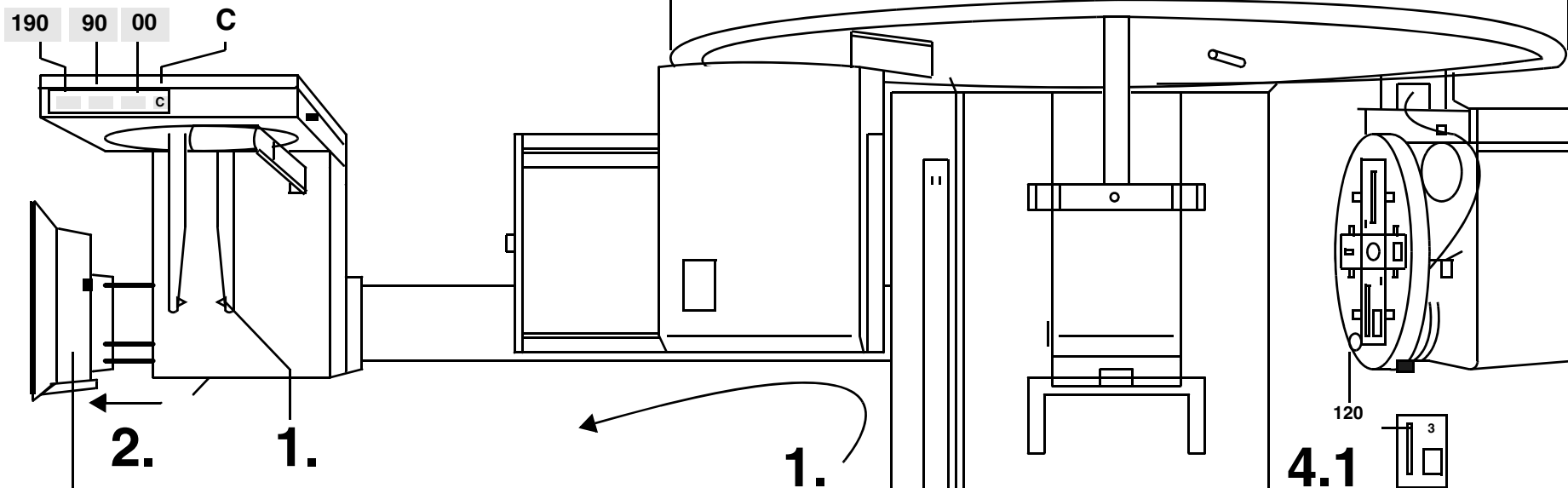
D

- Adjust primary diaphragms 30 and 40 successively on the diaphragm wheel.
  - Press locking button **D** to adjust the diaphragm wheel.  
Radiation will be generated only if button **D** is correctly engaged.
1. On the screen use selection dialog **Selecting a service exposure** to activate **Diaphragm adjustment (3)**.
  2. Set radiation time  $s = 0.60 \text{ sec.}$  (or  $s=0.64 \text{ sec.}$ )
  3. Set **60 kV/09 mA**.
  4. Release **Radiation**.  
The beam must appear (horizontally and vertically) in the center of the diaphragm display on the screen.
  5. **Adjusting the primary diaphragm:**
    - U** "High-Low" beam correction  
Loosen two screws **E** by one turn each.  
Make the beam correction with screw **A** (eccentric).  
Retighten screws **E**.
    - V** "Horizontal" beam correction and
    - W** "Right-Left" beam correction  
Loosen two screws **E** by one turn each.  
Make the beam correction with screws **B** and **C** (eccentrics).  
Retighten screws **E**.  
If the correction is not sufficient, symmetry must be adjusted on the Cephalometer (see section **Checking symmetry on the Cephalometer**,  see page 4 - 23).
  6. **Adjusting the patient diaphragm:**  
Loosen locking screw **G**.
  - V/U "Horizontal"/"High-Low" beam correction**  
Use the two screws **F**.  
Retighten screw **G**.



## 2. 1. 3.

190 90 00 C



1. Remove and save adjusting caps.
2. Swing the ear olive holder (digital display **90**) and the cassette holder out of the beam. Ear olives are opened and the nose support is tilted up.
3. Fully retract ← the cassette holder (digital display **185 – 190**).
4. Angular position of the head holder must show **00** on the digital display.

**Two adjustments are required:**

#### 4.1 Adjustment A (asymmetry)

Select primary diaphragm 3 with the diaphragm wheel.

Set the soft tissue filter to position 120. Engage the lateral cassette holder at the mark **18x24 A**. Insert the opened cassette all the way to the stop.

#### 4.2 Adjustment S (symmetry)

Select primary diaphragm 4 with the diaphragm wheel. Engage the cassette holder at **18x24 S**. Insert the opened cassette all the way to the stop.

5. Select **maximum values for kV/ma and radiation time.**

6. Release **Radiation.**

**Generate radiation only for the time necessary to recognize the beam position!**

An unexposed parallel margin must be visible around the edge of the radiographic screen.

#### X "High-Low" beam correction:

Loosen two screws **E**. Make the beam correction with screw **A** (eccentric). Retighten screws **E**.

#### Y "Vertical" beam correction:

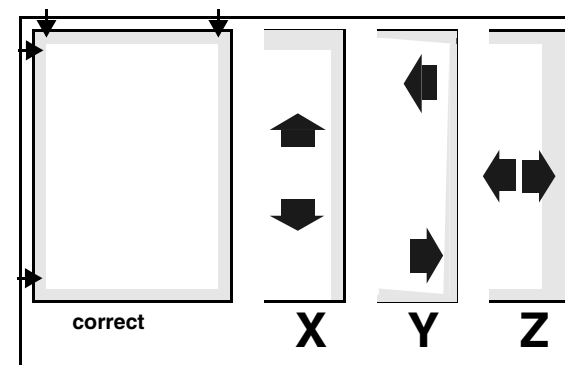
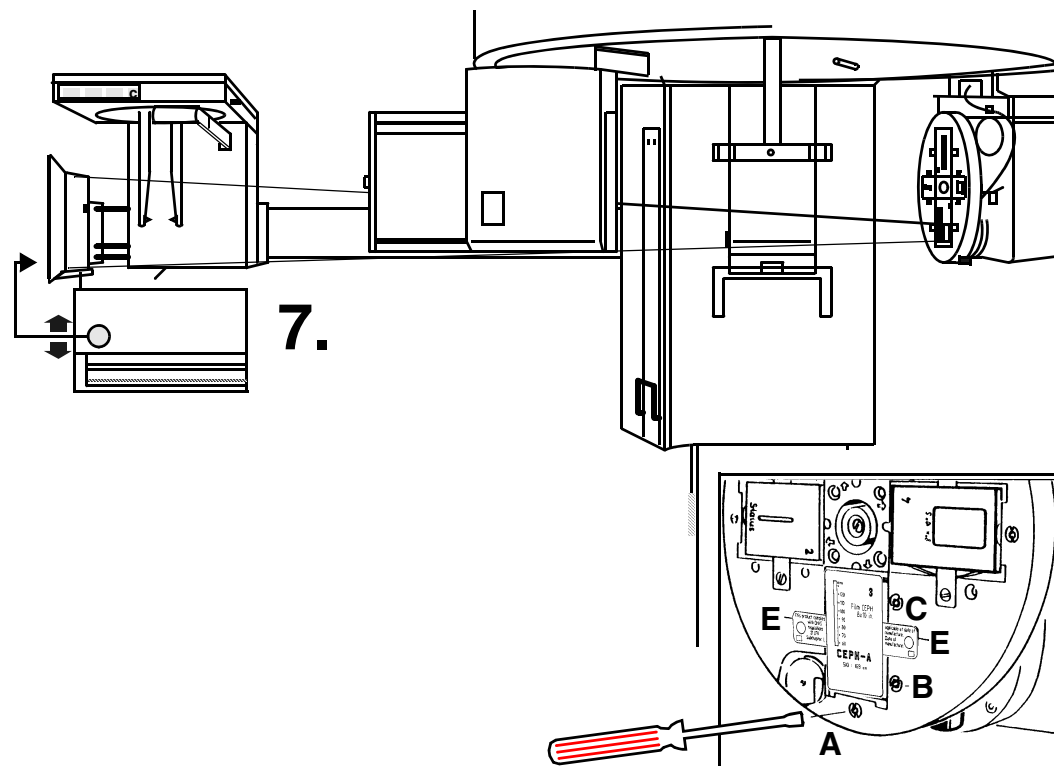
Loosen two screws **E**. Make the beam correction with screws **B** and **C** (eccentrics). Retighten screws **E**.

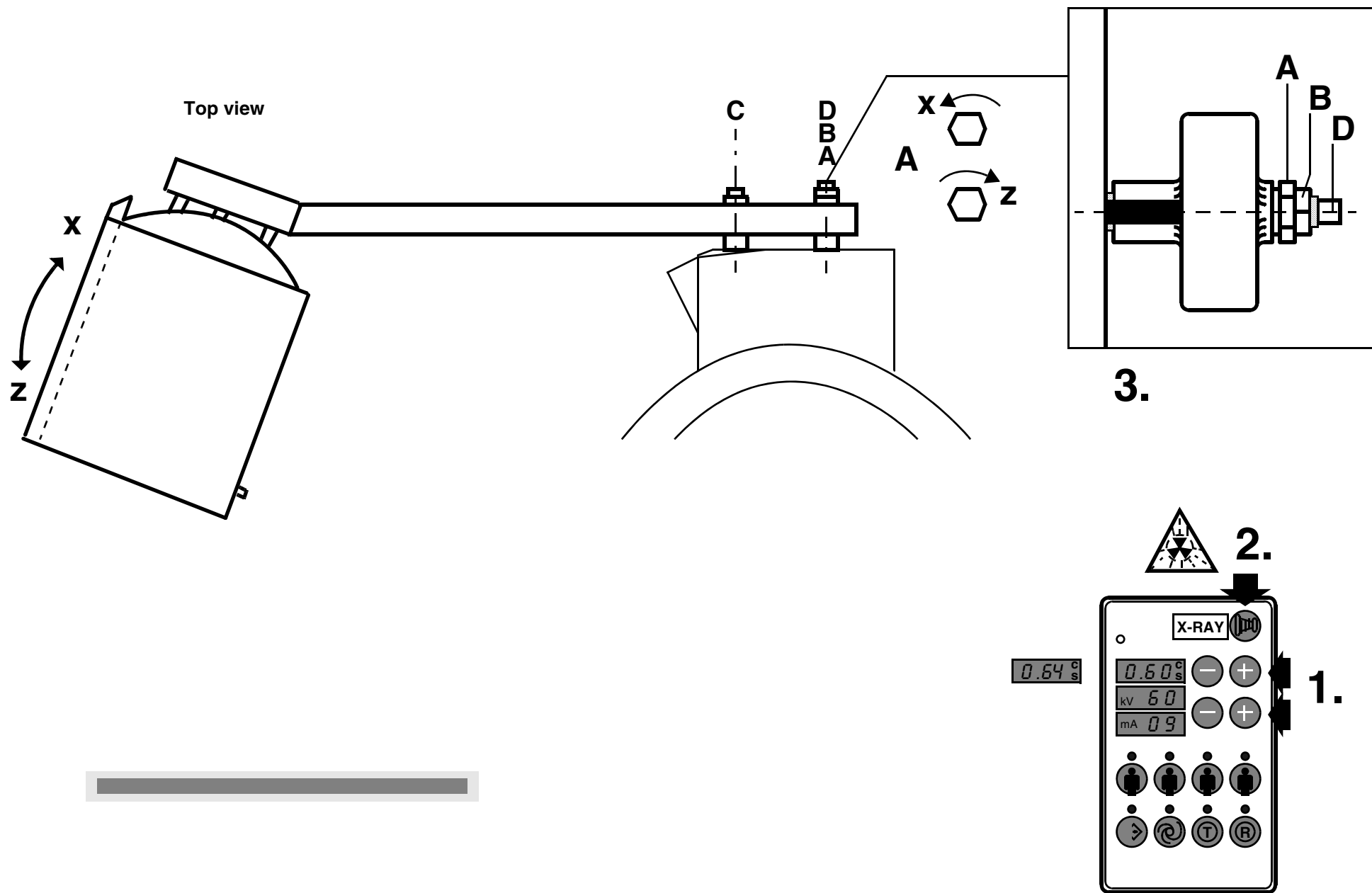
#### Z "Right-Left" beam correction:

Loosen two screws **E**. Make the beam correction with screws **B** and **C** (eccentrics). Retighten screws **E**.

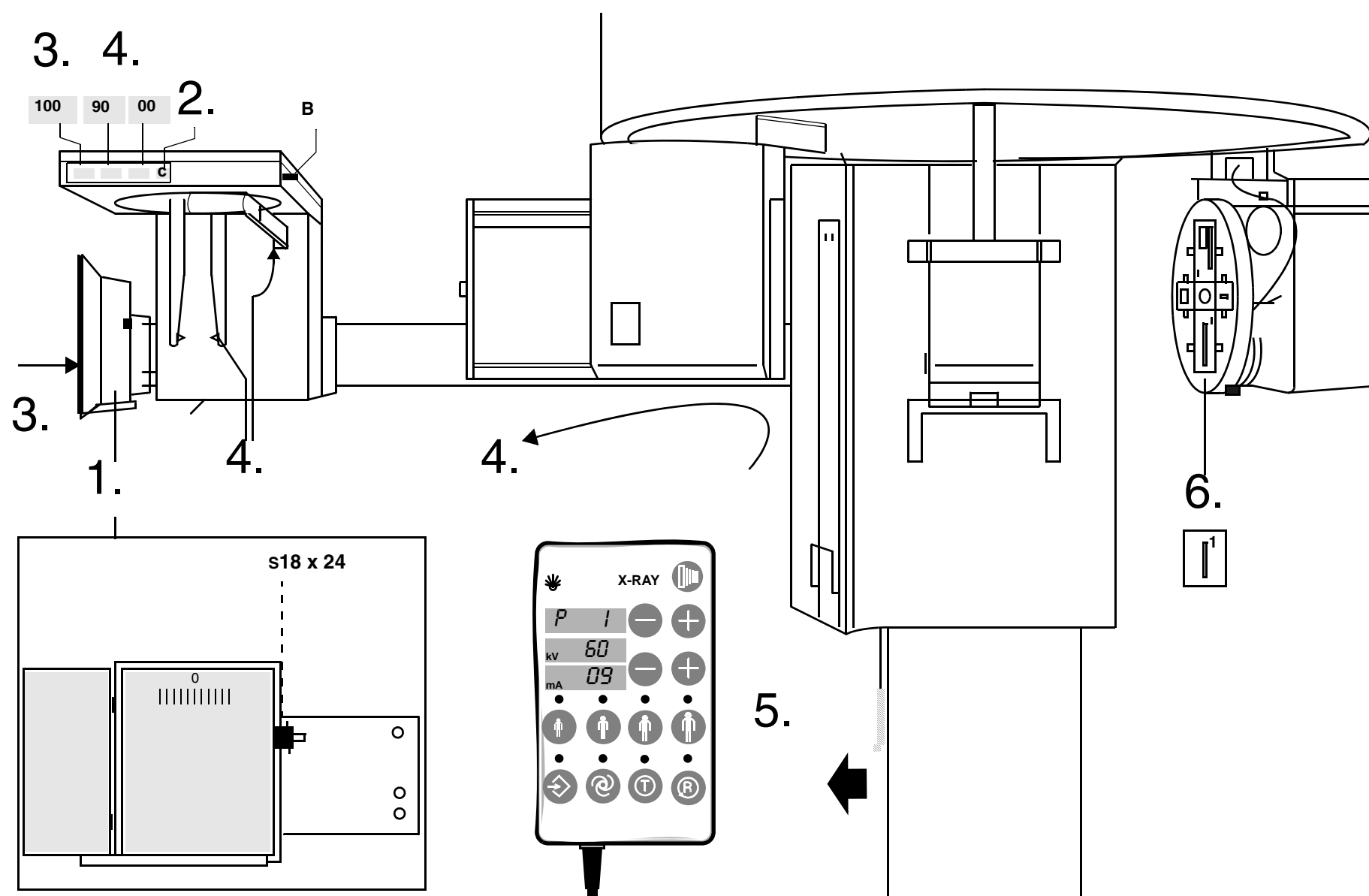
#### NOTE

If the beam correction with the diaphragm adjusting screws is not sufficient, the U section of the cassette holder can be slackened and readjusted.





- From the selection dialog **Select service exposure** activate **diaphragm adjustment (3)**.
- 1. Select radiation time  $s = 0.60$  sec.(or  $s=0.64$  sec.) and **60 kV / 09 mA**.
- 2. Release **Radiation**.  
The radiation field must appear in the center of the diaphragm display.
- 3. **In case of radiation field offset:** Loosen screws **C** and **D** make the correction with threaded socket **A**.  
**ATTENTION! When adjusting the threaded socket A hold eccentric screw B and do not change its setting.**
- 3.1 Radiation field is offset to the left:  
Turn the threaded socket **A** in **z** direction.
- 3.2 Radiation field is offset to the right:  
Turn threaded socket **A** in **x** direction.
- **NOTE:** One turn of threaded socket **A** corresponds to a shift of the radiation field by approximately 15 mm.
- Retighten screws **C** and **D**.  
Repeat the radiation/correction process until the radiation field is centered to the diaphragm display.
- Close the diaphragm displays.

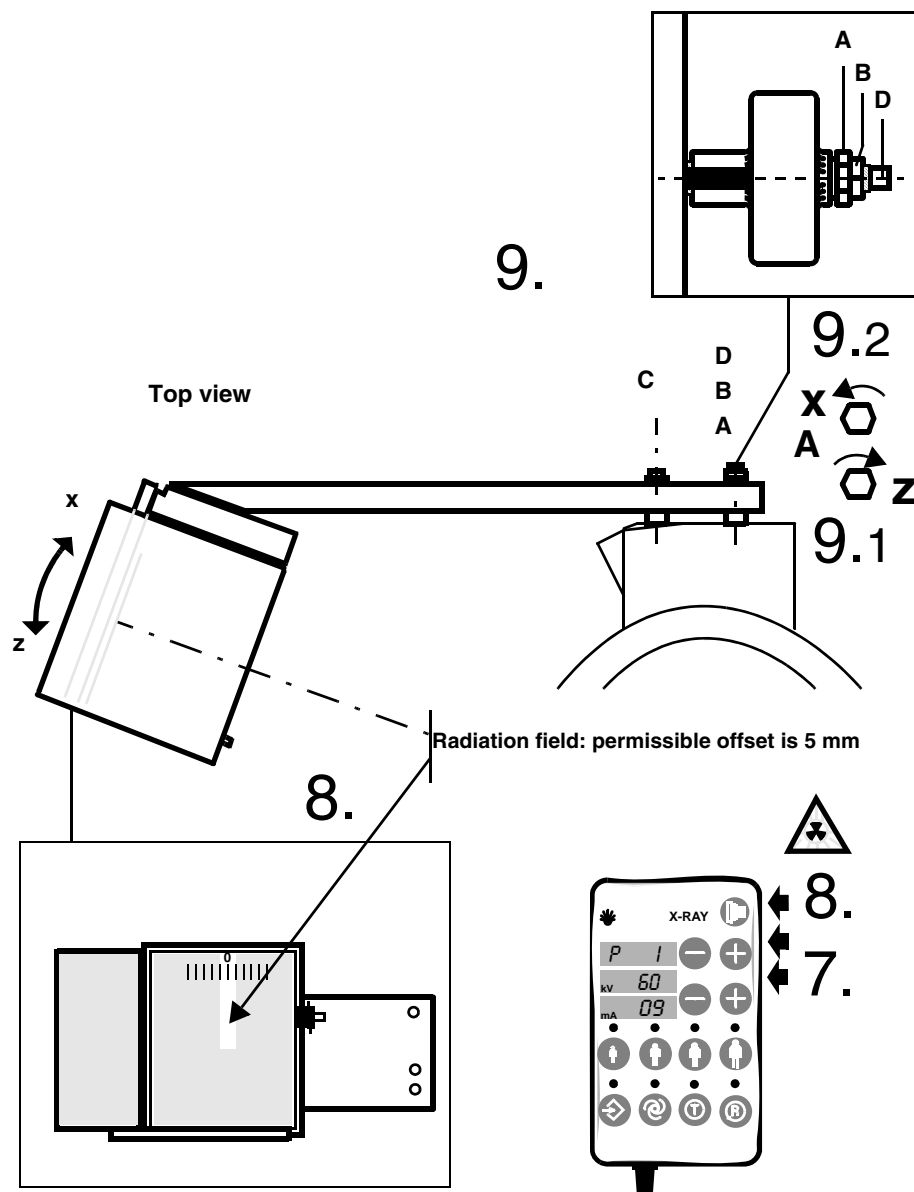


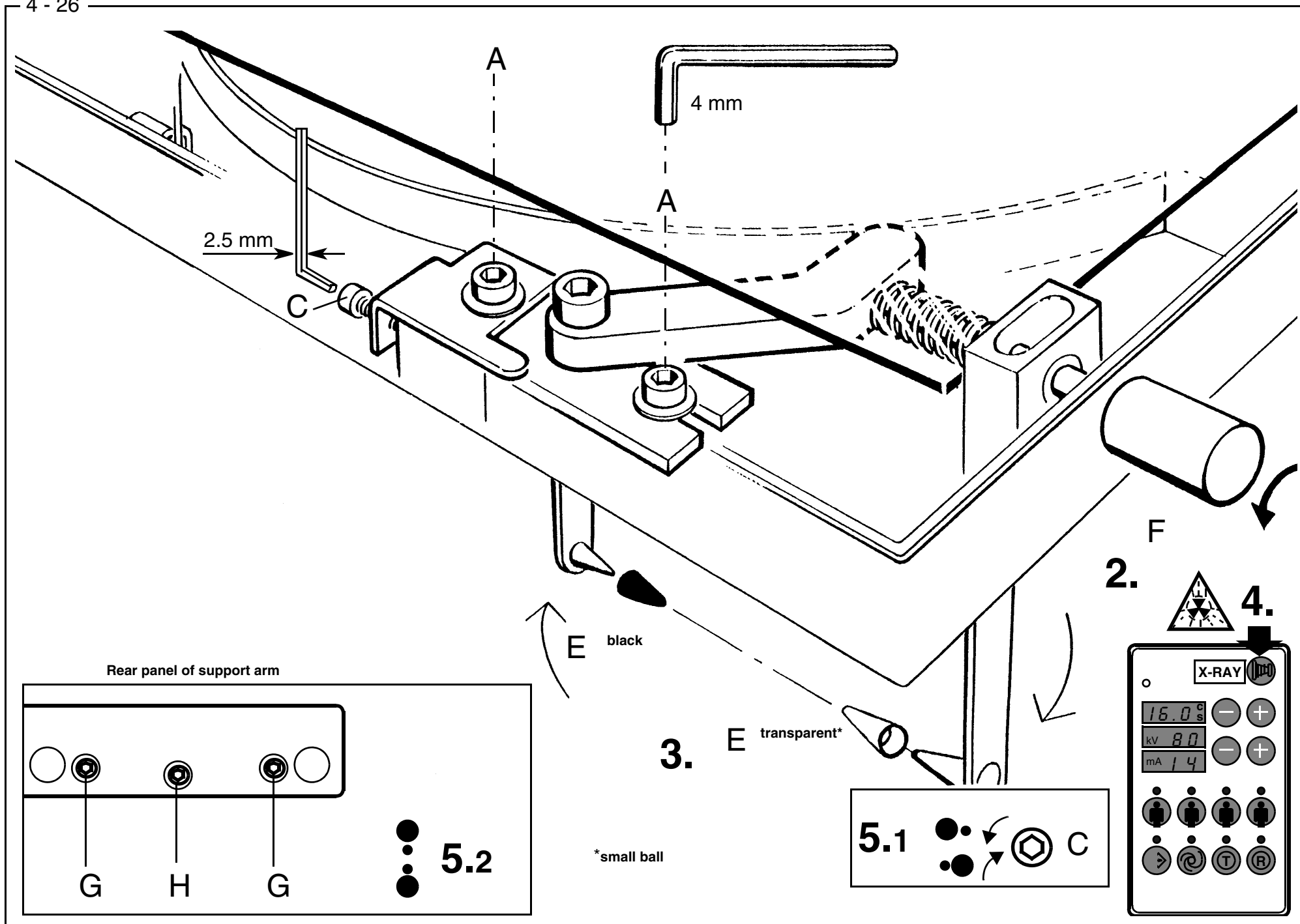


1. Open the film cassette. Place the adjustment screen supplied into the cassette and secure it with adhesive tape. Engage the lateral cassette holder at mark **S 18x24**. Insert the opened cassette all the way to the stop.
2. Press the **C** key. The digital displays light up. The Cephalometer must not be tilted (digital display **00**).
3. Put the cassette holder in all the way → (digital display **100**).
4. Swing the nose support out of the beam. Turn the ear olive holder (threaded button **B**) out of the beam direction (digital display **90**). Swing the cassette holder for Panorama radiographs out of the beam.
5. Select Service program **S.02**, test step 2.
6. Press the Return key **R**. The X-ray tube assembly travels to the position for cephalometry. Select primary diaphragm **1** at the diaphragm wheel.
7. Select **90kV** on the Multitimer.
8. Darken the room.  
**ATTENTION! RADIATION.**  
Release radiation only as long as necessary to recognize the beam position. The radiation field must be **centered** to the **0 mark** on the adjustment screen.
9. **If the radiation field is offset:**  
Loosen screws **C** and **D** and make the correction with threaded socket **A**.  
**IMPORTANT: When adjusting the threaded socket A, hold eccentric screw B and do not change its setting.**
  - 9.1 **Radiation field is offset to the left:**  
Rotate threaded socket **A** in **z** direction.
  - 9.2 **Radiation field is offset to the right:**  
Rotate threaded socket **A** in **x** direction.

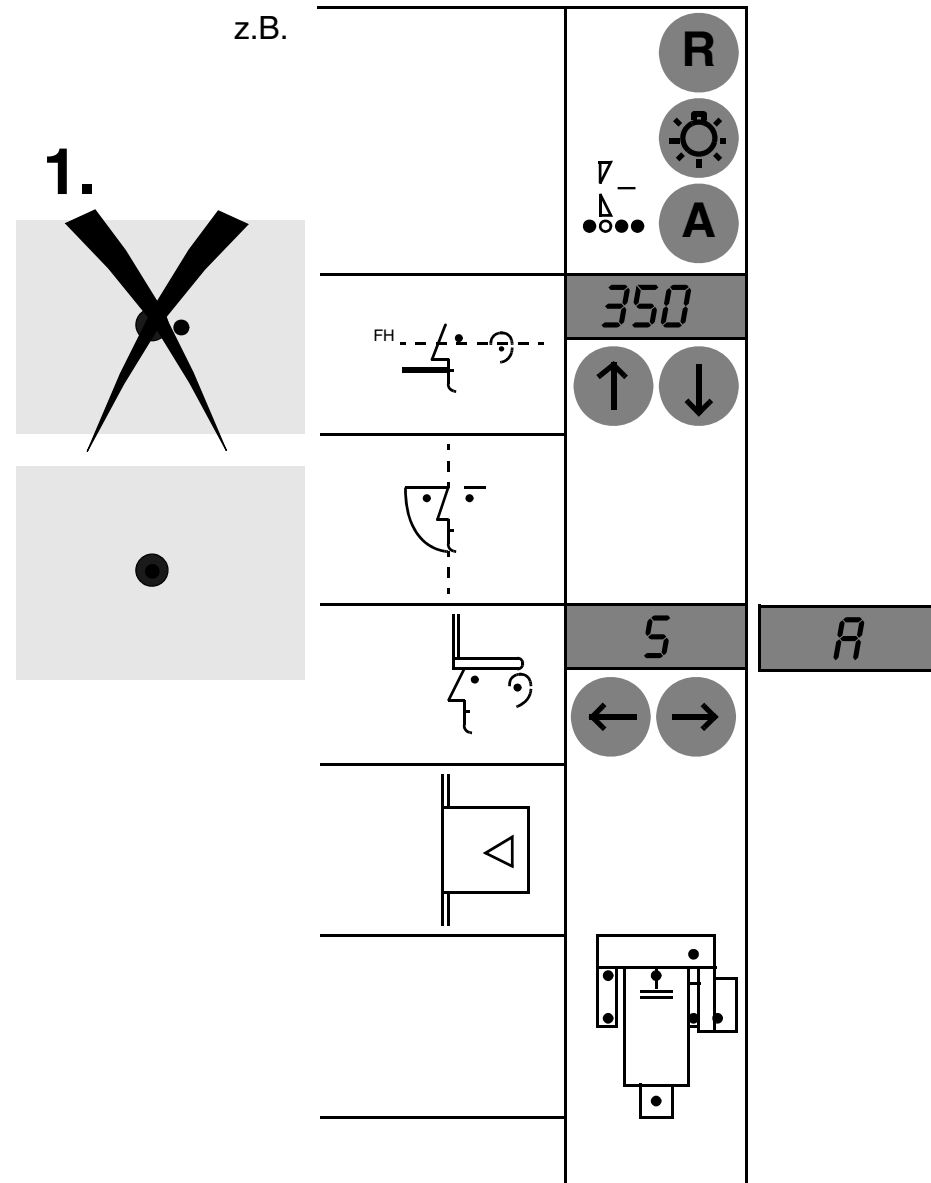
NOTE: One turn of the threaded socket **A** corresponds to a shift of the radiation field in the cassette plane by approximately 15 mm.

  - Retighten screws **C** and **D**.
  - Repeat the radiation/correction process until the radiation field is centered to the **0** mark.
  - Remove the adjustment screen from the cassette.



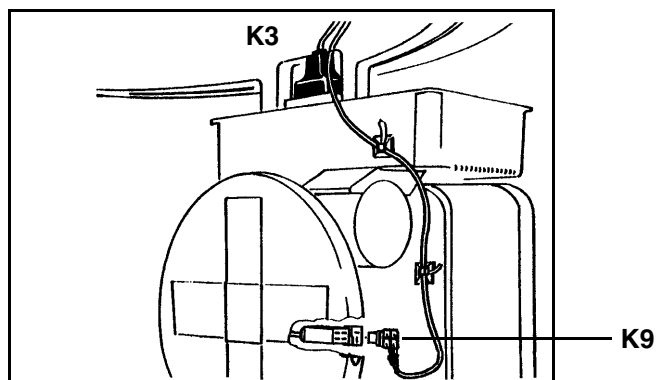
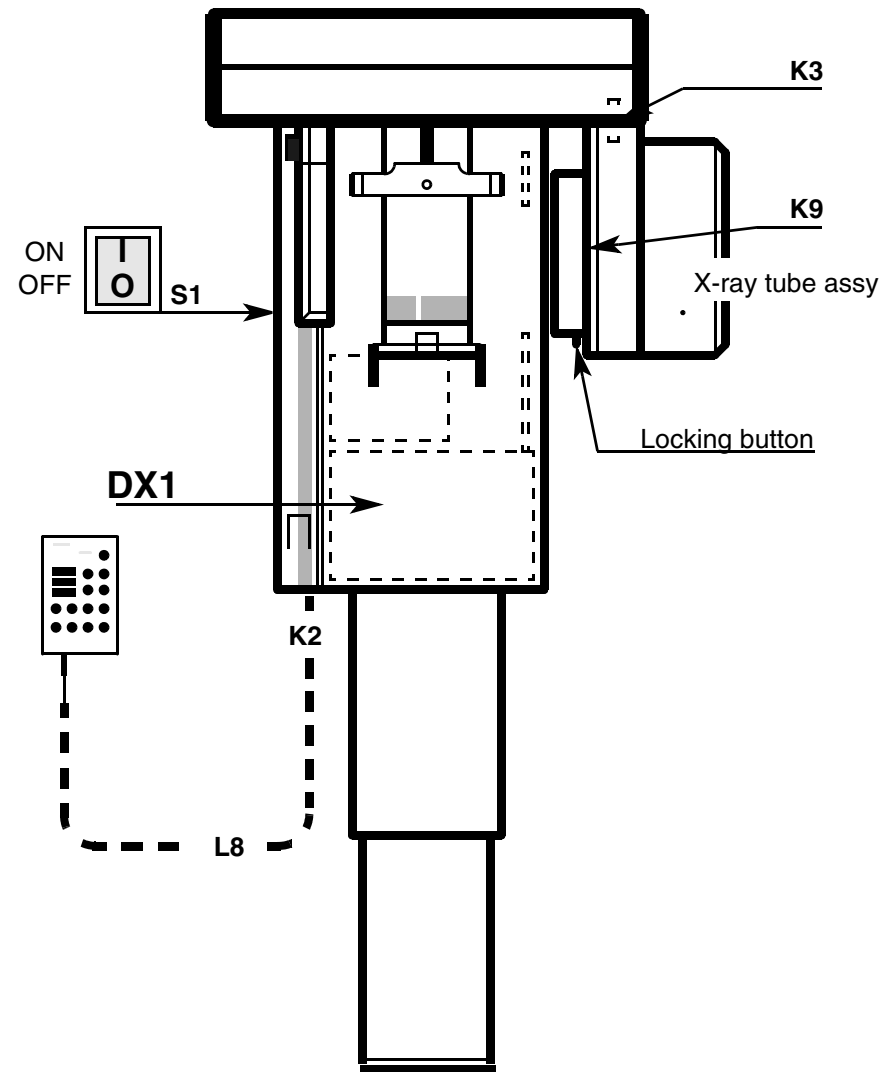
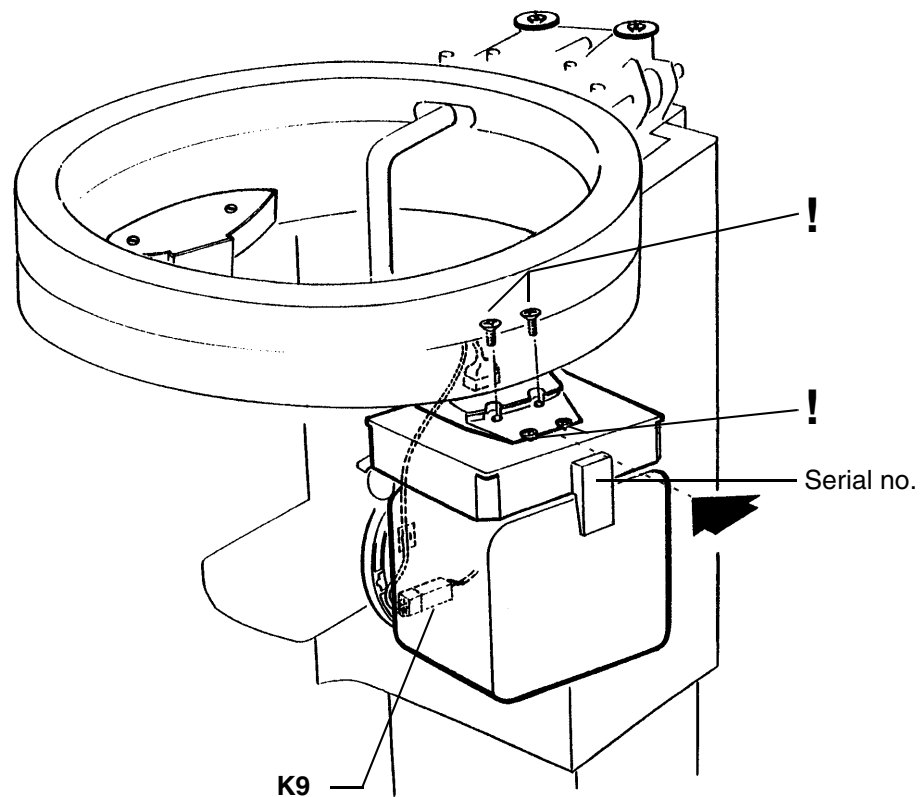


- From the selection dialog **Select service exposure** activate **Quality test exposure (4)**.
  - NOTE: If help message H4/06 appears, the height adjustment keys  $\uparrow\downarrow$  on the unit must be pressed. The dots and the three numbers on the digital height adjustment display must then disappear (see Operating Instructions).
- Metal balls in the adjustment caps are displayed as dots on the screen.  
**The two dots must exactly coincide.**
  - Loosen knob **F** and swivel the ear olives into the beam path.
  - Pull the ear olive holder apart and fit the adjusting caps **E** over the ear olives.
  - Release **RADIATION** until the slot of the image receptor has reached the position below the ear olives.  
Evaluate the display on the screen.
  - If the dots do not correctly register, adjust as follows:**
    - HORIZONTAL**  
Unscrew the upper cover.  
Slightly loosen the screws **A**.  
Turn screw **C** (see above for direction).  
Retighten screws **A**.
    - VERTICAL**  
Loosen the two screws **G** on the rear of the support arm.  
Slightly loosen screws **H**.  
Rotate the Cephalometer around screw **H**.  
Retighten screws **G** and **H**.
- Repeat the exposure and check the position of the dots again
  - Remove caps **E** and keep them with the unit.  
Reattach the upper cover.
  - Check the X-ray beam once more.





- Metal balls in the adjustment caps are displayed as dots on the screen.  
**The two dots must exactly coincide.**
- 1. Pull out the cassette holder all the way and attach an intraoral film with adhesive tape.
- 2. Loosen knob **B** (rotate ccw) and swivel the ear olives into the beam path.
- 3. Pull the ear olive holder apart and fit the adjusting caps over the ear olives.
- 4. Prepare the unit for cephalometry (see Operating Instructions).  
Select 2.00 sec and  $\geq 62$  kV at the Multitimer.  
Release **RADIATION**. Develop and evaluate the film.
- 5. **If the two dots do not exactly coincide, adjust as follows:**  
Unscrew the upper cover.
- 5.1 **HORIZONTAL**  
Loose the two screws **A**.  
Turn screw **C** (see above for direction). Retighten screws **A**.
- 5.2 **VERTICAL**  
Turn screw **F** (see above for direction).
- Repeat the exposure and check the position of the dots again.
- Remove caps **E** and keep them with the unit.
- Reattach the upper cover.



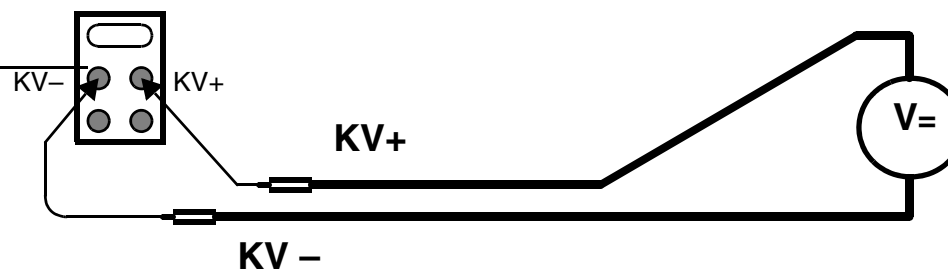
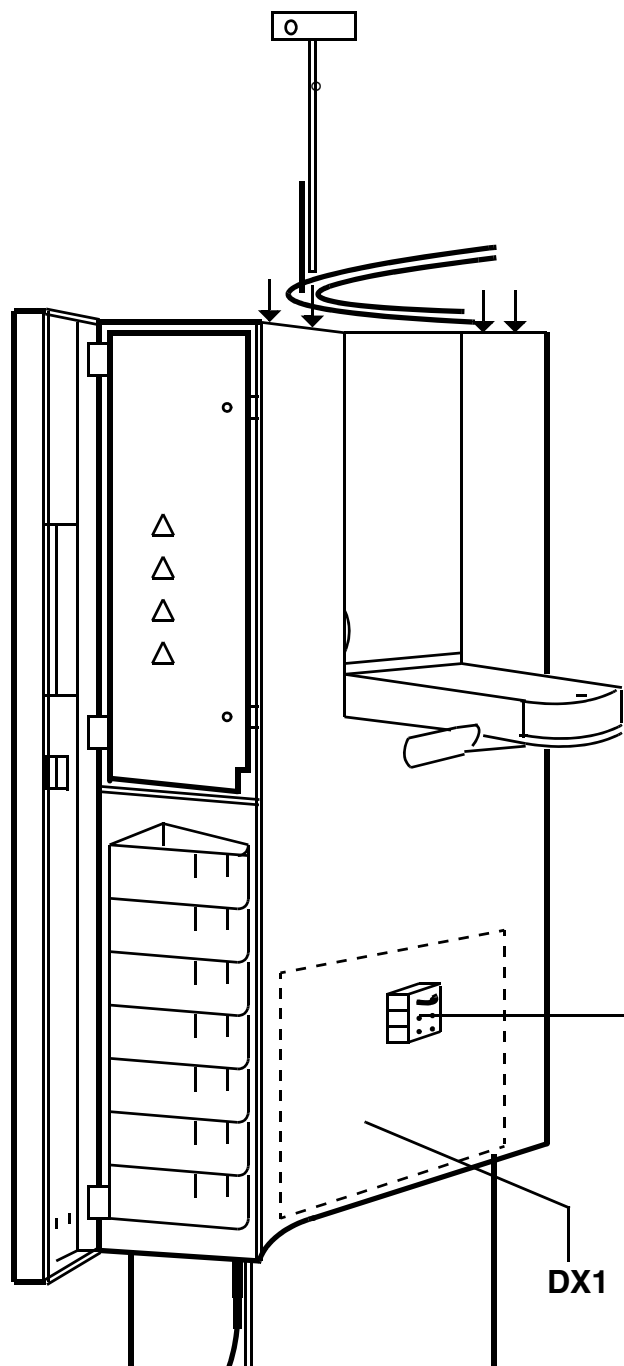
**The following steps must be taken:**

1. Loosen the clamp which secures the shield.  
Unplug connector K9. Cut the cable ties.  
ATTENTION: Heavy weight! Unscrew the X-ray tube assembly (four screws) and disconnect K3. Attach the new X-ray tube assembly and connect K3. Tighten the four mounting screws.  
Plug in connector K9 and secure the cables with cable ties.
  2. Install the diaphragm wheel (diaphragm 1 or 10 downward!) on the new X-ray tube assembly (one screw in the center). Ensure that the locking button functions properly!
  3. Adjust board DX1 to the new X-ray tube assembly.  
Proceed according to section '**Adjusting board DX1**', see page 4 - 39.
  4. ORTHOPHOS Plus DS: Readjust diaphragms 10 and 2 for Panorama radiographs.  
ORTHOPHOS 5/Plus: Readjust diaphragms 1 and 2 for Panorama radiographs.  
Proceed according to section '**Checking and adjusting the X-ray beam for panorama radiographs**', see page 4 - 13.
  - 4.1 Orthophos Plus DS Ceph: Readjust diaphragms 30 and 40 for cephalometry.  
Orthophos Plus Ceph: Readjust diaphragms 3 and 4 for cephalometry.  
Proceed according to section '**Checking and readjusting the X-ray beam for cephalometry**', see page 4 - 19 or see page 4 - 21.
- The X-ray tube assembly is now matched to the other unit components.  
Enter the new serial number in the Warranty Passport.

In Germany:

Perform an Acceptance test according to the "Röntgenverordnung" (X-ray ordinance).

## 4.9 X-ray tube assembly: action to be taken during/after replacement



up to 5.25 sec:  $7.3 \text{ V} \pm 0.4 \text{ V}$   
from 6.25 to 7.85 sec:  $8.1 \text{ V} \pm 0.1 \text{ V}$   
after 8.85 sec:  $7.3 \text{ V} \pm 0.4 \text{ V}$



- During a Panorama radiograph of the spinal column region the kV value is automatically increased by up to 17% according to the kV/mA setting.  
This kV increase can be measured as follows:
- Adjust for narrow jaw width,  
set user offset to 0 using Service routine S.11,  
deselect AES.

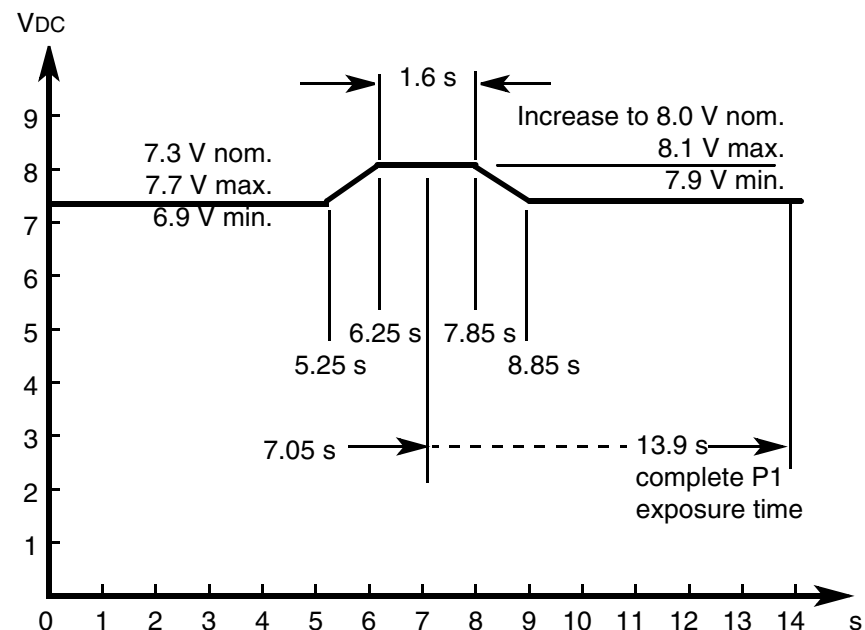
- Remove the small metal cover.
- Connect a voltmeter to **KV+** and **KV-** and select measuring range **20 V**.
- Turn the unit ON and wait for the self-adjustment to execute.
- Press the **R** key. The X-ray tube assembly travels to the start position.
- Example for an exposure: Select program **P1** and **73kV** step on the Multitimer.  
The ready LED must be off.
- ATTENTION: RADIATION!** Press the release button and wait for a complete rotation.

The following values must be reached:

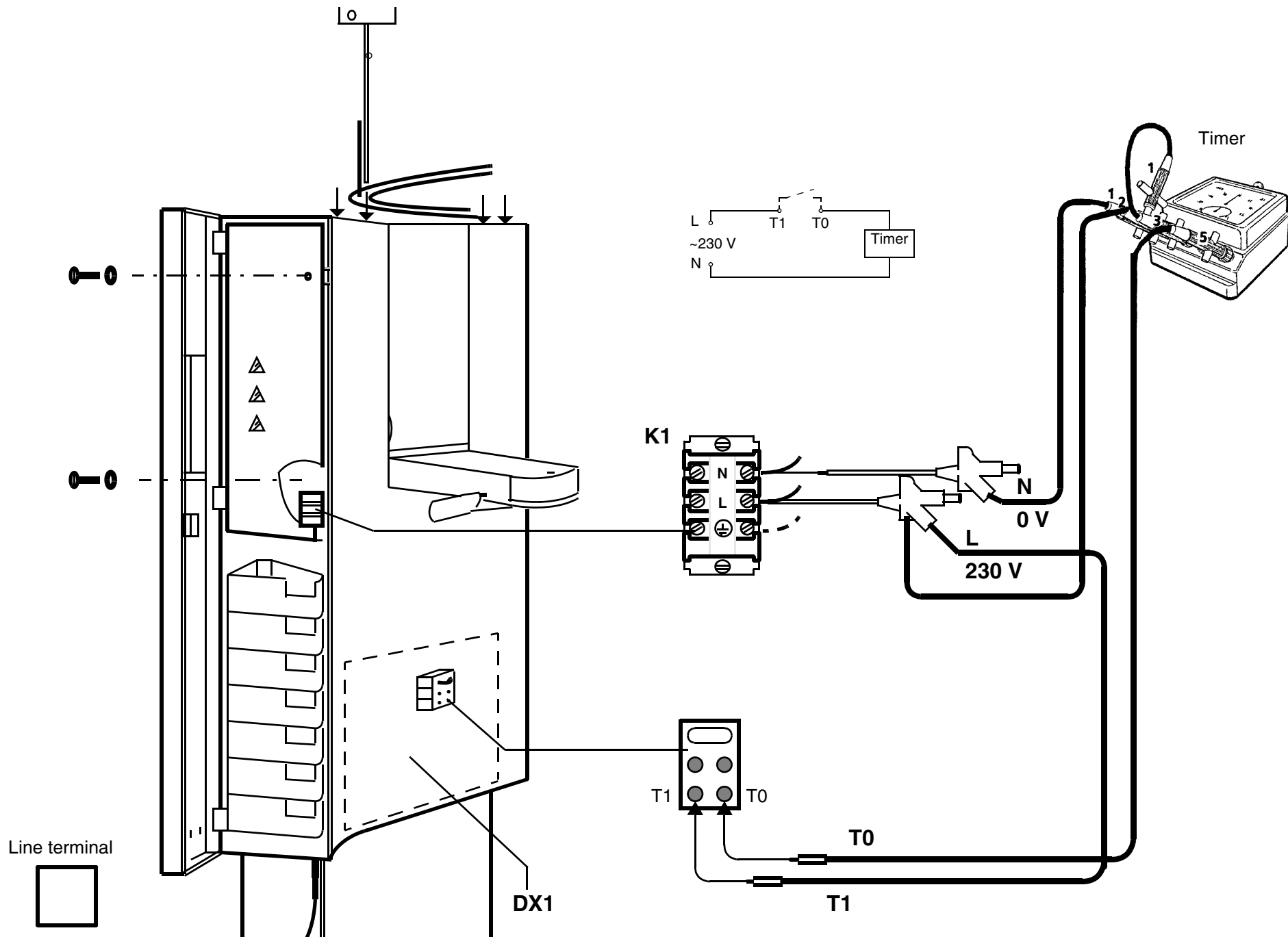
up to 5.25 seconds:  $7.3 \text{ V} \pm 0.4 \text{ V}$   
from 6.25 to 7.85 sec:  $8.1 \text{ V} \pm 0.1 \text{ V}$   
after 8.85 seconds:  $7.3 \text{ V} \pm 0.4 \text{ V}$

If the value  $8.1 \text{ V} \pm 0.1 \text{ V}$  is not reached, board DX1 is defective.


Replace board DX1 and perform "Adjusting board DX1", see page 4 - 39.




## 4.10 Radiographic density of spinal column not correct



**1. Panorama radiograph**

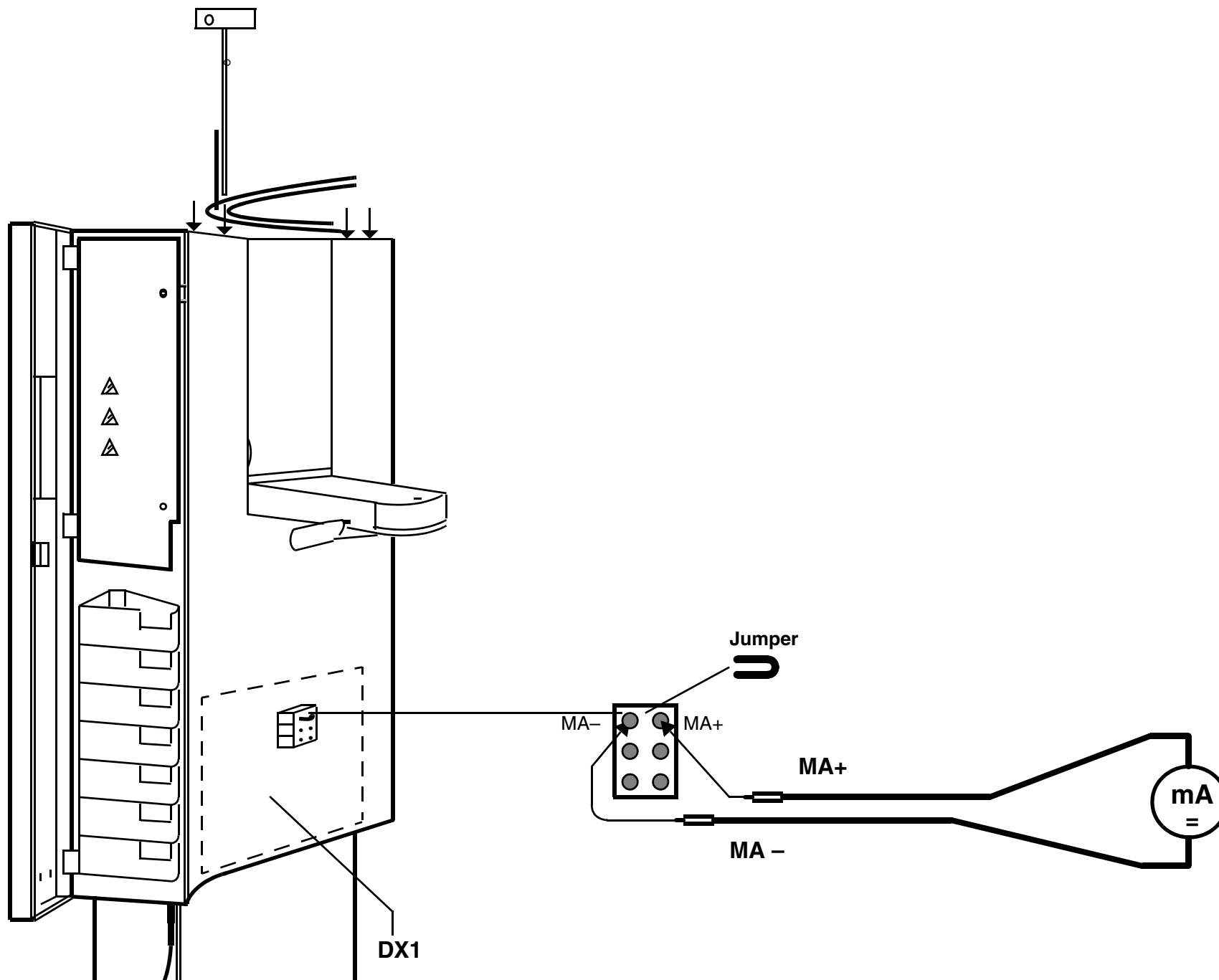
- Turn the unit OFF. Switch off the power supply line for the building.
- Take off the side cover and the front cover.
- Connect the timer to K1.N (0 V) and K1.L (230 V) (line voltage).
- Connect the leads to test jacks T0 and T1.
- Switch the power line and then the unit ON. Wait for the self-adjustment to execute.  
Move the X-ray tube assembly to the start position (by pressing the R key).  
ORTHOPHOS Plus DS: select diaphragm 10.  
ORTHOPHOS 5/Plus: select diaphragm 1.
- Fully open the temple support!
- Select program **P1** and **73kV** step on the multimeter.
- **ATTENTION: RADIATION!** Press the release button until the X-ray display switches off automatically (complete rotation).
- The timer must indicate an exposure time of **14.1 s**  $\pm$  0.7 s.
- If the specified exposure time is not reached:  
Replace board DX 1 and perform '**Adjusting board DX1**',  see page 4 - 39.

**2. Cephalometry**

- Leave the timer connections unchanged.
- ORTHOPHOS Plus DS Ceph: Set the Ceph function by selecting diaphragm 30 or 40.  
ORTHOPHOS Plus Ceph: Set the Ceph function by selecting diaphragm 3 or 4 and press the C key on the Cephalometer and select 4s radiation time.
- Select **73kV** step on the Multitimer.
- **ATTENTION: RADIATION!** Press the release button until the X-ray display switches off automatically.
- The timer must indicate an exposure time of **15.7 s**  $\pm$  0.3 s for ORTHOPHOS Plus DS and **4 s**  $\pm$  0.2 s for ORTHOPHOS 5/Plus.
- If the specified exposure time is not reached:  
Replace board DX 1 and perform '**Adjusting board DX1**',  see page 4 - 39.

---

**4.11 Checking exposure times**



1. Unscrew the cover.
2. Remove the MA+/MA jumper and connect the ammeter instead. Select the 20 mA measuring range.
3. Turn the unit ON. Wait for the self-adjustment to execute.
4. Select Service routine **S.01**.

**Additionally with ORTHOPHOS Plus DS / Plus DS Ceph:**

Establish SIDEXIS exposure readiness by selecting **Constancy check** in the service menu

**Service exposure**

**Factory service (2)**

**5. First measurement**


- Select the following step on the Multitimer: for 20 film-screen or ORTHOPHOS Plus DS/Plus DS Ceph 60kV/9mA.  
for 33 film-screen 60kV/6mA

**ATTENTION: RADIATION!** Press the release button, hold it pressed and take the measurement. The ammeter must read **9 mA/6mA ± 0.14 mA**.

**6. Second measurement**

- Select the following step on the multimeter: for 20 film-screen or ORTHOPHOS Plus DS/Plus DS Ceph 66kV/16mA.  
for 33 film-screen 70kV/10mA

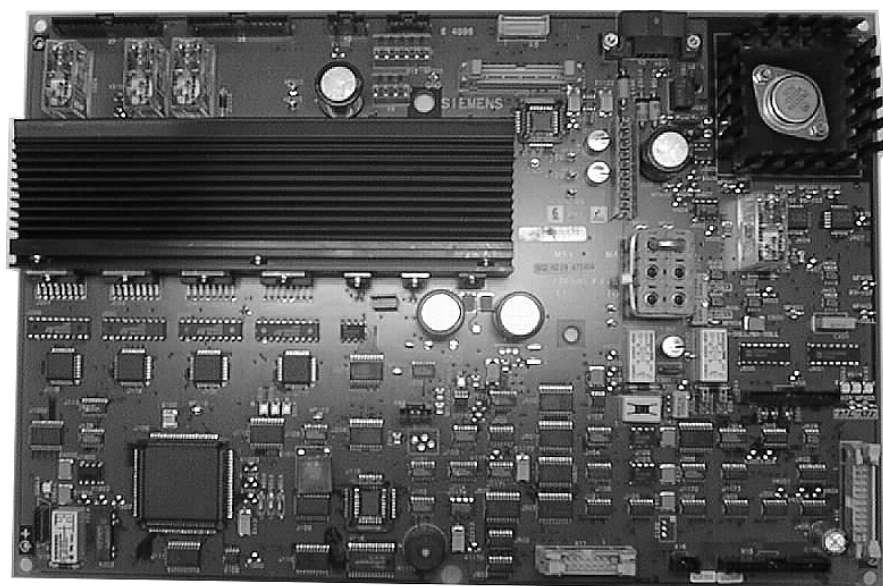
**ATTENTION: RADIATION!** Press the release button, hold it pressed and take the measurement. The ammeter must read **16mA/10mA ± 0.25 mA**.

- If the specified mA values are not reached, the mA setpoint must be checked:
- Select Service routine **S.03**, test step 02 or 04, and set the mA setpoint (see section "Service routines").
- If the specified values are now reached and check the tube current again as described above.
- If the specified values are still not reached, adjust board DX1.  
If this is not possible, replace board DX1 and perform '**Adjusting board DX1**',  see page 4 - 39.  
If the values are still not reached, replace the X-ray tube assembly.
- Disconnect the ammeter and place the jumper back to MA+/MA-.

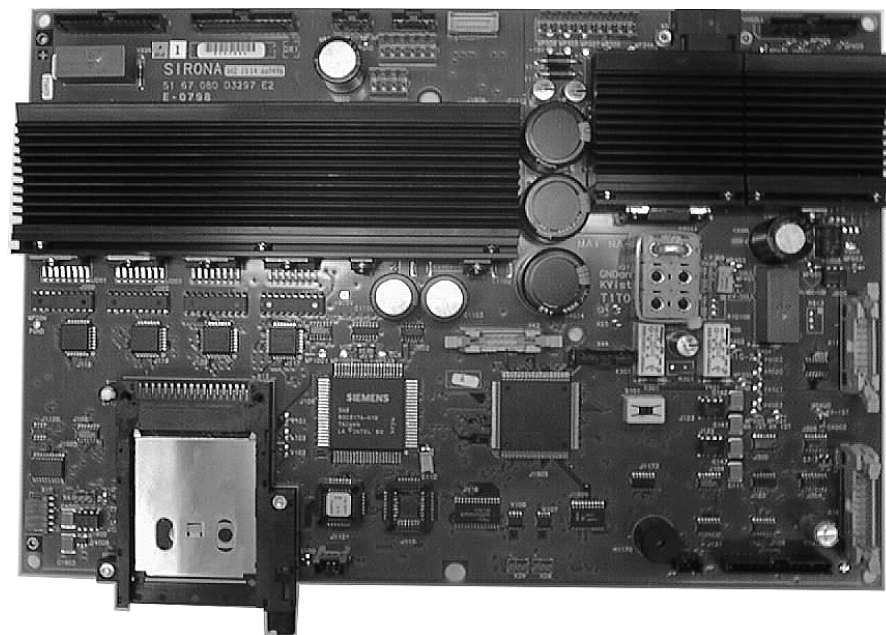
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## 4.12 Checking the tube current

33 13 108



51 67 080

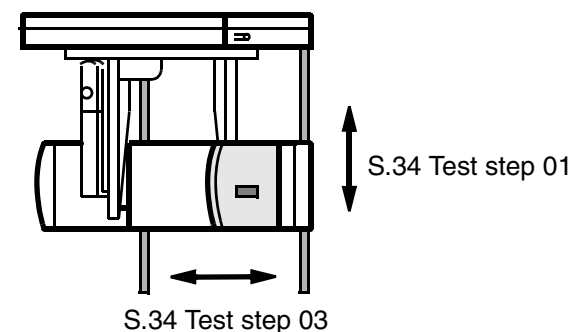


- After replacing the board plug in all connectors so that they are properly engaged.
- After turning the unit ON it executes the self-adjustment. Wait until the usual displays of program/exposure time, kV and mA light up on the Multitimer.
- Perform all checks and adjustments according to section **Service routines**.
- Select Service routine **S.03**,  
Adjust **setpoint values** for kV, mA and preheating.

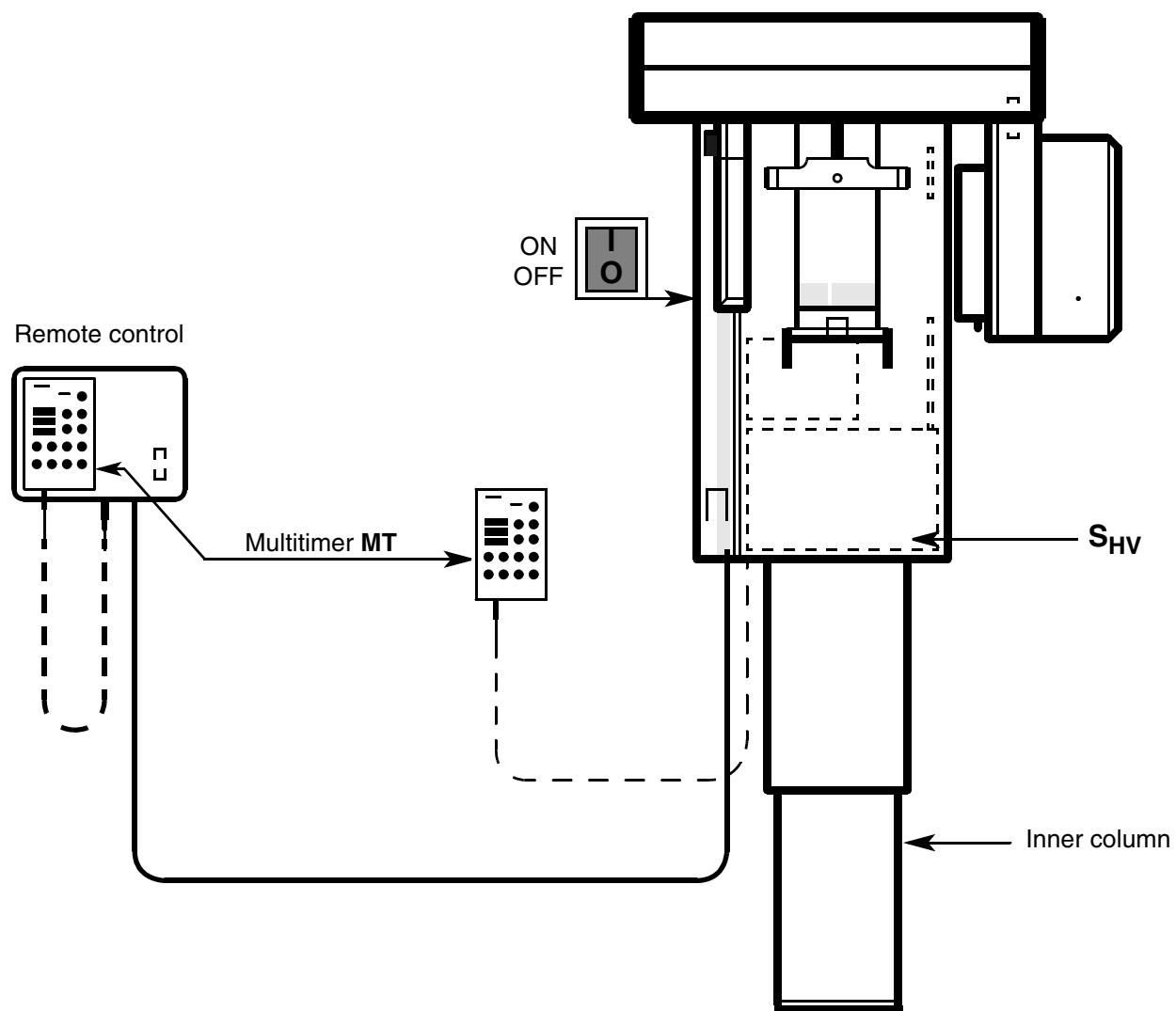
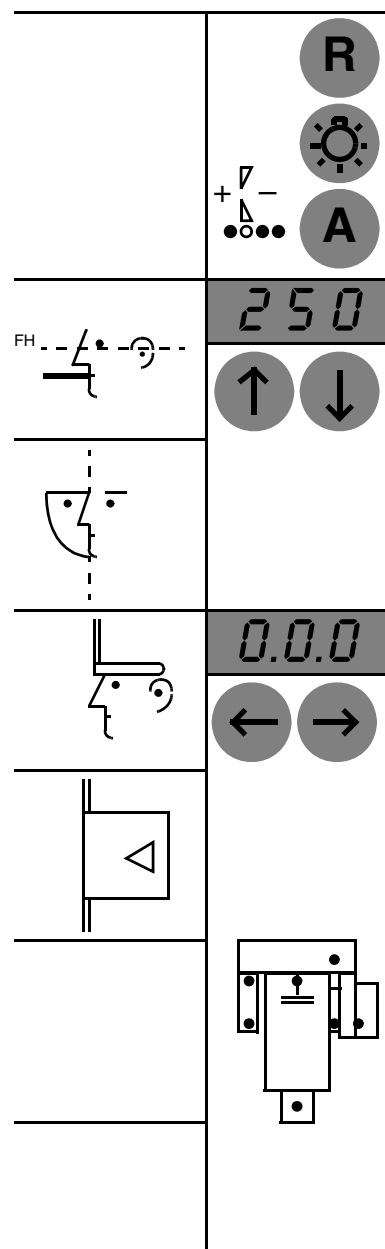
|                                                                                                                                                                                                                                                                                               |                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| For <b>DX1 33 13 108</b><br>Select Service routine <b>S.03</b> test step <b>04</b><br>and <b>delete offset only</b> .<br>Perform Service routine <b>S.03</b> test step <b>02..</b><br>Perform Service routine <b>S.03</b> test step <b>03</b><br>adjust with potentiometer R644 <b>5,5V</b> . | For <b>DX1 51 67 080</b><br>Perform Service routine <b>S.03</b> test<br>step <b>04</b> completely. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
- Select Service routine **S.05**, test step **02** (automatic system).  
Perform the **Heating adjustment**.
- Select Service routine **S.04**, test step **03**.  
Check the **actual values** of kV, mA and preheating.
- Select Service routine **S.21**.  
Program the **diaphragms**.
- Select Service routine **S.20**.  
Adjust the **forehead support width**.
- Select Service routine **S.18**.  
Check the proper function of the **height adjustment** (PWM).
- For film units set required film-screen combination with S.25 and then check and adjust AES with S.26
- For digital systems from version 031 of the memory card, adjust kV/mA step series with Service routine S.25 according to local regulations and possibly as desired by customer.
- Board DX1 is now correctly matched to the X-ray tube assembly.
- Reattach all shielding covers!  
Screw the small metal cover on again.
- Turn the unit OFF and ON again to exit the service routines.

**Only with ORTHOPHOS Plus DS Ceph**

- Select Service routine **S.34**, test steps **01** and **03**.  
Check the Ceph arm.
- Select Service routine **S.18**, test step **07**.  
Adjust the PWM and the speed of the Ceph movement.

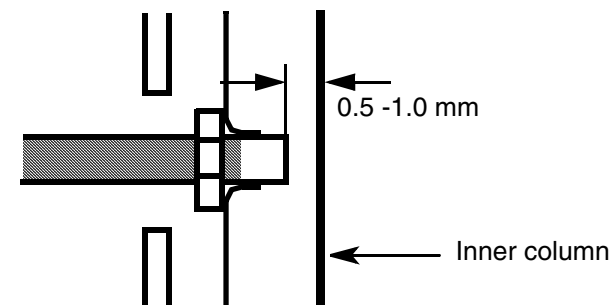
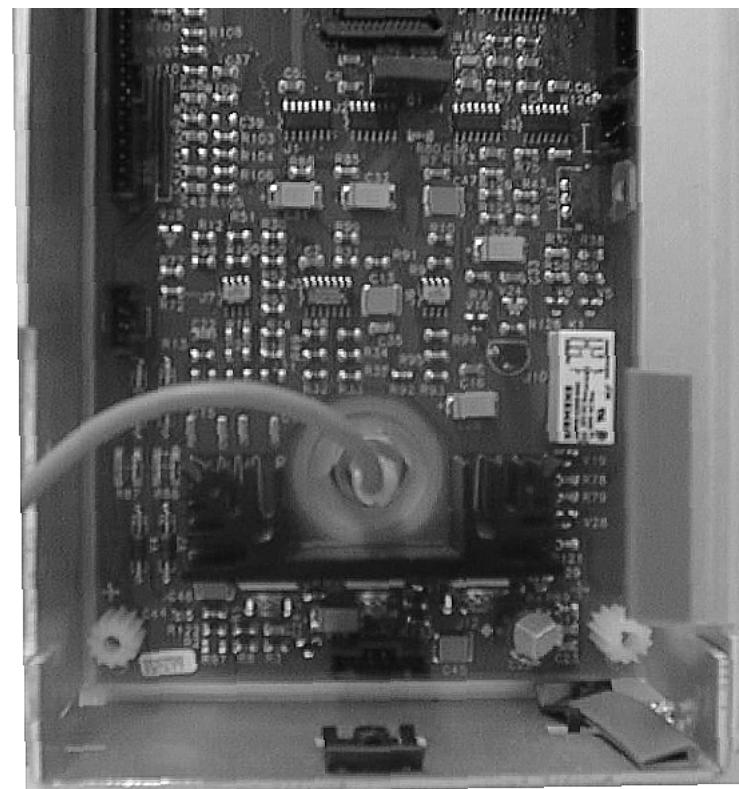


## 4.13 Adjusting board DX1

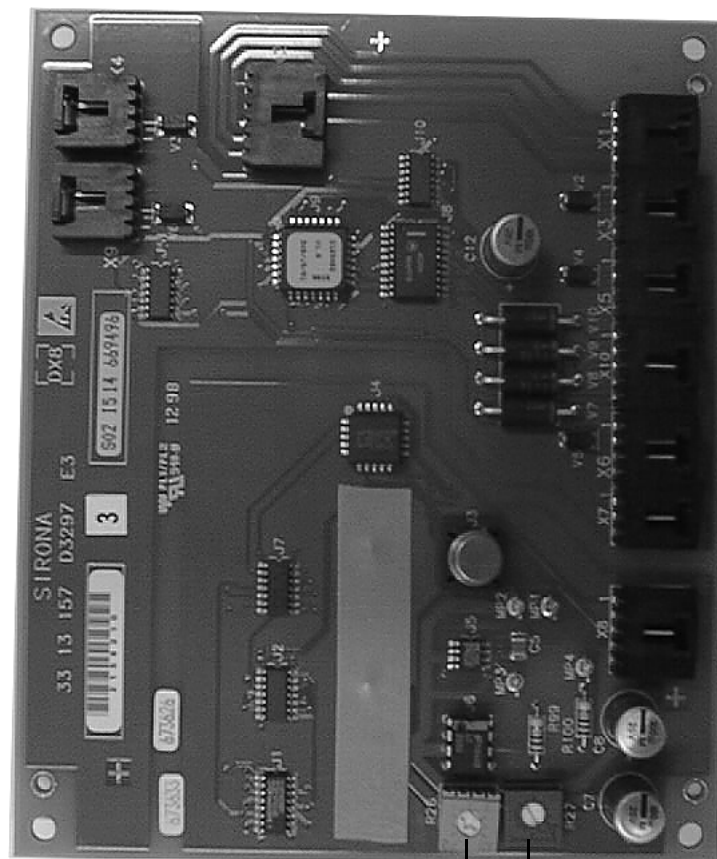




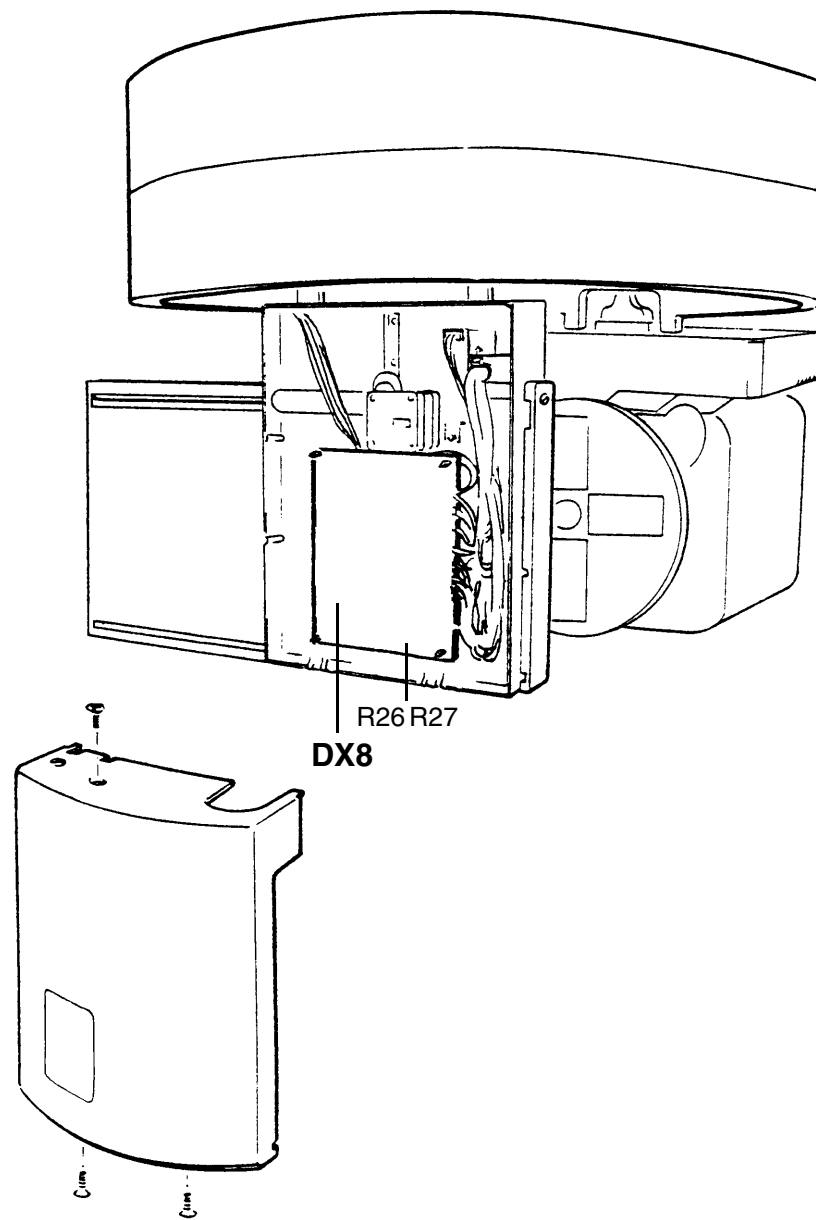
1. Select Service routine **S.18**, test step **01**.
  2. Drive the unit below the center position (300) of the stand travel range (otherwise there is a risk of cutting off the correction switch when moving the unit downward).
  3. Screw in the correction switch until its actuation surface contacts the surface of the column.
  4. Turn the correction switch back 3/4 turn and tighten the nut (tolerance  $\pm 1/4$  turn).
  5. Drive the unit up to position 640. When passing the switching edge the display must indicate decimal points.
  6. Drive the unit down to position 000. When passing the switching edge, the decimal points on the display must disappear.
- During the movement the indication of the decimal points must be stable and the indication for the alteration frequency on the frontal support display must not flash.  
Upon pressing the height adjustment keys the sound emitted by H1 must be audible 1 to 3 times per second.
  - **Possible faults:**  
Display of decimal points is not stable: correction switch is not correctly adjusted or the switch is defective or DX1 defective.  
Frontal support indication flashes: stand does not move freely.
  - Turn the unit OFF and ON again to exit the service routine.



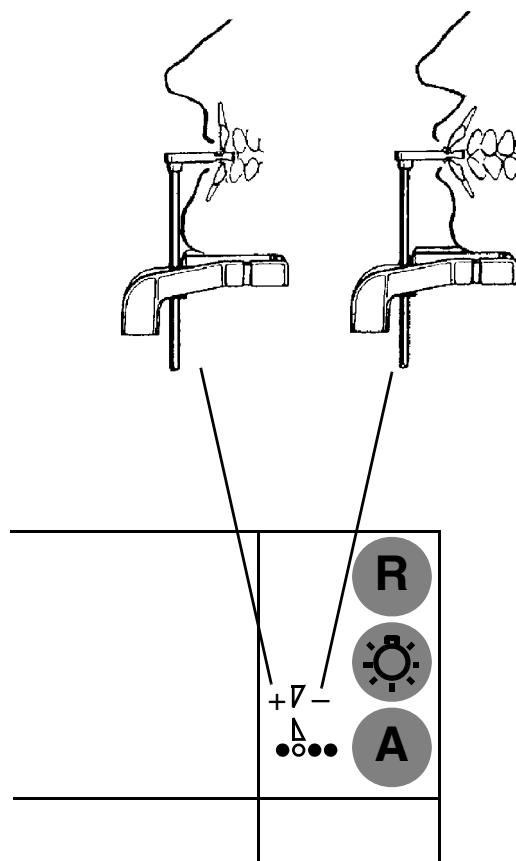
## 4.14 Adjusting the correction switch for height adjustment





R26 R27



- After replacing the board insert all connectors so that they are properly engaged.
- After turning the unit ON it executes the self-adjustment. Wait until the usual indications for program/exposure time, kV and mA light up on the Multitimer.
- Perform all checks and adjustments according to section **Service routines**.
- Select Service routine **S.25** (if required).  
Set the **Film/screen combination**.
- Select Service routine **S.26**.  
Perform **Checking and adjusting AES**.
- **Attach to the secondary diaphragm the test body supplied for this specific unit** and secure it with adhesive tape. Check its position: the test body must be exactly vertical!
- Turn the unit OFF and ON again to exit the service routines.



- The Anomaly step is usually set to "0" (neutral) prior to each exposure. It is, however, also possible to set it to another default value (+1; -1; -2).
1. Select program P1. In the Anomaly basic setting, the 2nd LED from the left (Asia: 3rd LED from the left) lights up.
  2. Press the Rotation Test key .  
The LED above the T key is lit.
  3. Press the Memory key.  
The LED above the Memory key flashes.
  4. Select the required new default Anomaly step on the side control panel.  
Approx. 5s after the Anomaly key is released, the preselected Anomaly LED flashes for approx. 1s.  
Then the anomaly LED is lit continuously. The Anomaly step has been saved.
  5. Press the Rotation Test  key.

## 4.16 Change anomaly basic setting



## 5 **Service Routines**

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# Service Routines

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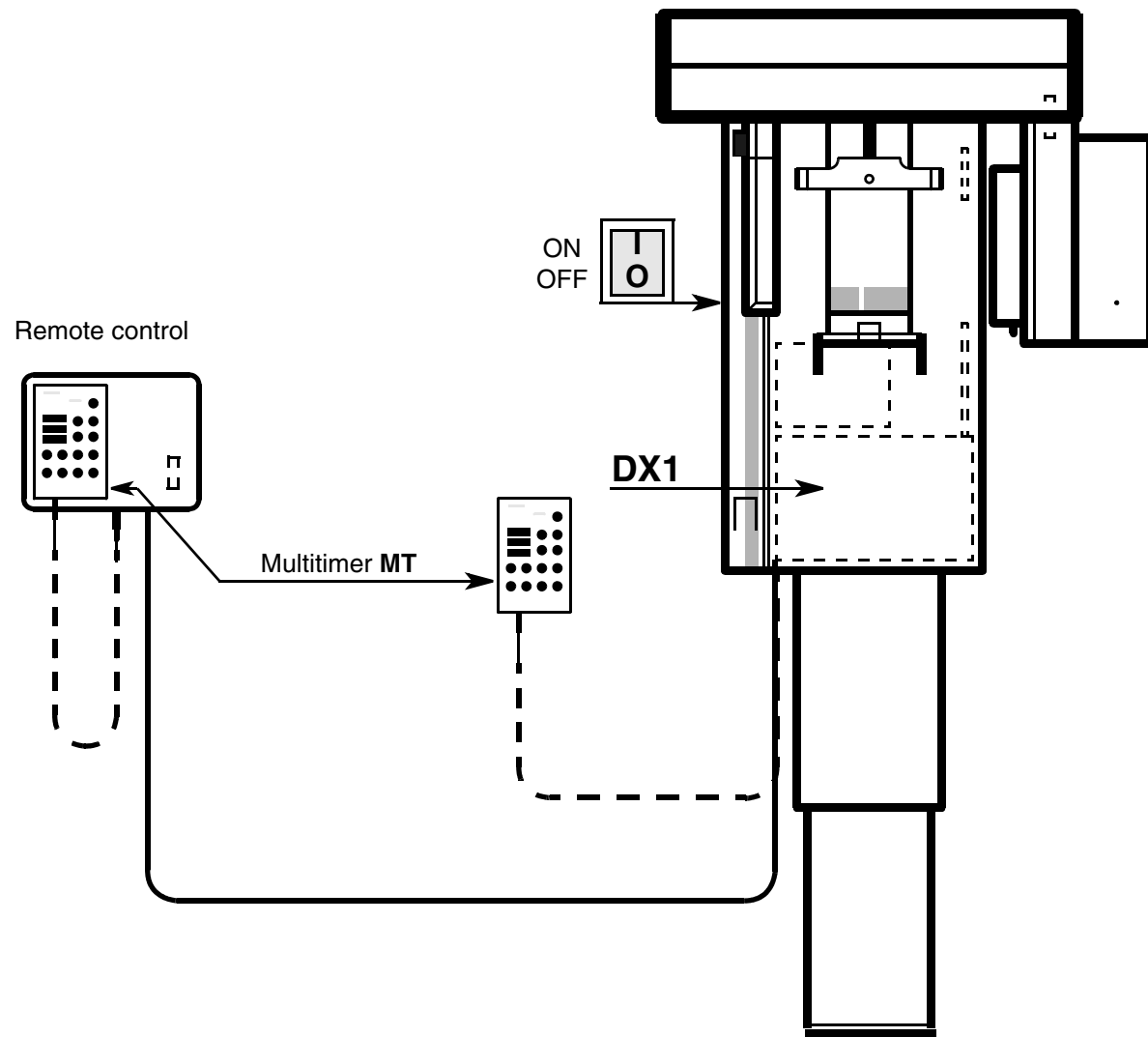
|      |                                                                                                        |        |
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- The Service routines are used to check the functionality of certain unit components and assemblies.

### Selecting a Service routine

1. Press the **Memory** key.
2. Then press the service key  for about 4 sec until the digital displays disappear.


#### Within 3 seconds:

3. Press the **Patient symbol** keys in the sequence **A – B – C** within 3 seconds.  
You have then entered the service mode.

If during the selection of the Service routine this sequence is not followed, a wrong key is pressed or the time is exceeded, the unit switches automatically back to the normal mode.

*\* A maximum of 99 error messages can be stored.*




*0E means that at this point the unit was turned OFF and ON again.*

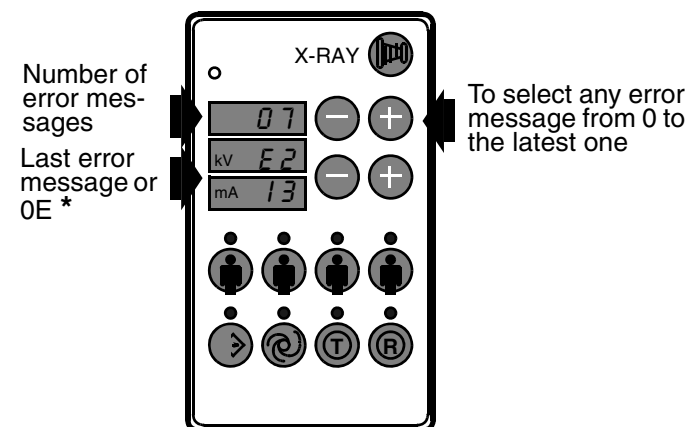
4. Press the service key .
5. Select the desired Service routine with the **+** or **-** keys (for example S.04).  
The selection of Service codes and test steps is described for the individual service routines on the following pages.






### Deselecting a Service routine

Switch the unit OFF and ON again.

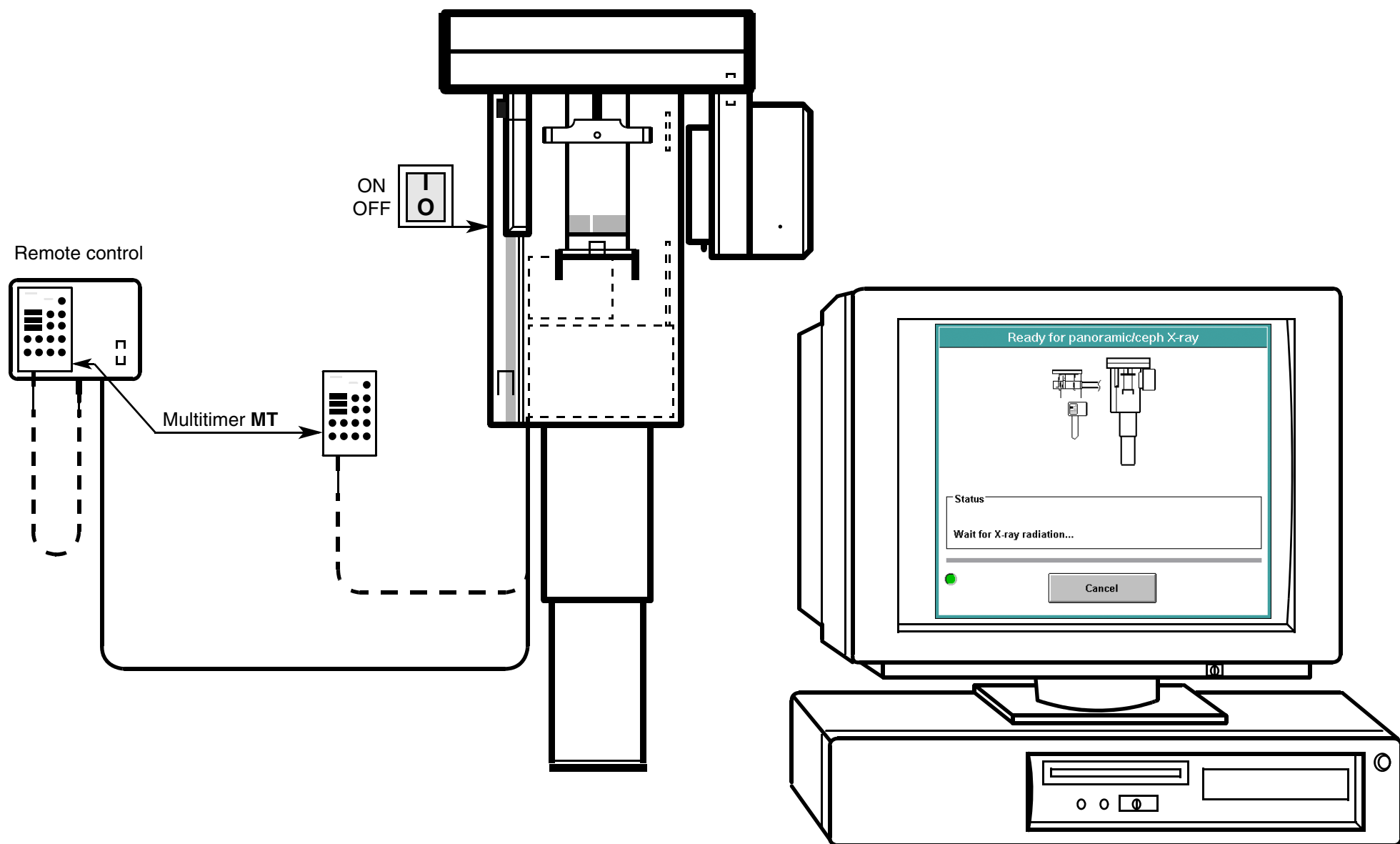
**ORTHOPHOS Plus DS/Plus DS Ceph: for all service routines with radiation, set exposure readiness via SIDEXIS. See next page.or set the Active signal internally with Service Routine S.35, test step 02.**  
see page 5 - 89

1. 
2.  4s press
3. 



4.  Service key 
5.   

## 5.1 Selecting Service routines



## Additionally for ORTHOPHOS Plus DS/Plus DS Ceph:

**For all Service routines with radiation, set exposure readiness via SIDEXIS.**

Switch on the PC and the monitor.

Activate the **Services** menu.

Activate the **Constancy check** menu item.

In the **X-ray apparatus** menu activate the **Select** menu window.

Activate the **XC XP** tool.

The selection dialog **Select type of check** appears:

**Service radiograph**  
**Approval test**  
**Constancy check**  
**Terminate**

If another dialog appears, select

**Terminate**

and activate **XC XP**.

In the dialog **Select type of check**

**activate Service radiograph.**

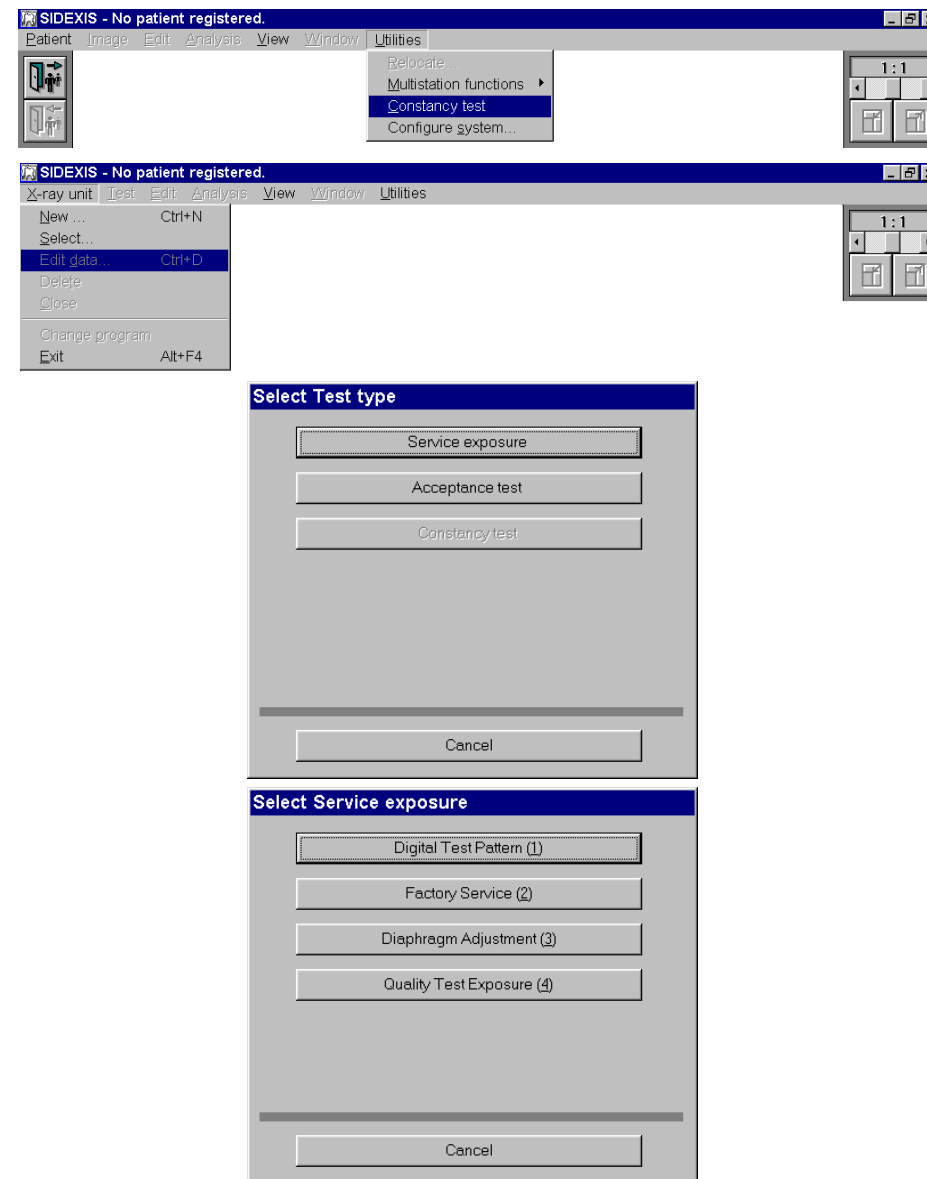
The selection dialog **Select Service exposure** appears.

**Digital test display (1)** (checks the transmission path ORTHOPHOS - PC)  
**Factory service (2)** (sets the locking signal for service program, if not E4 08)  
**Diaphragm adjustment (3)** (diaphragm adjustment, radiation field image)  
**Quality test exposure (4)** (test exposure not stored in PDATA)

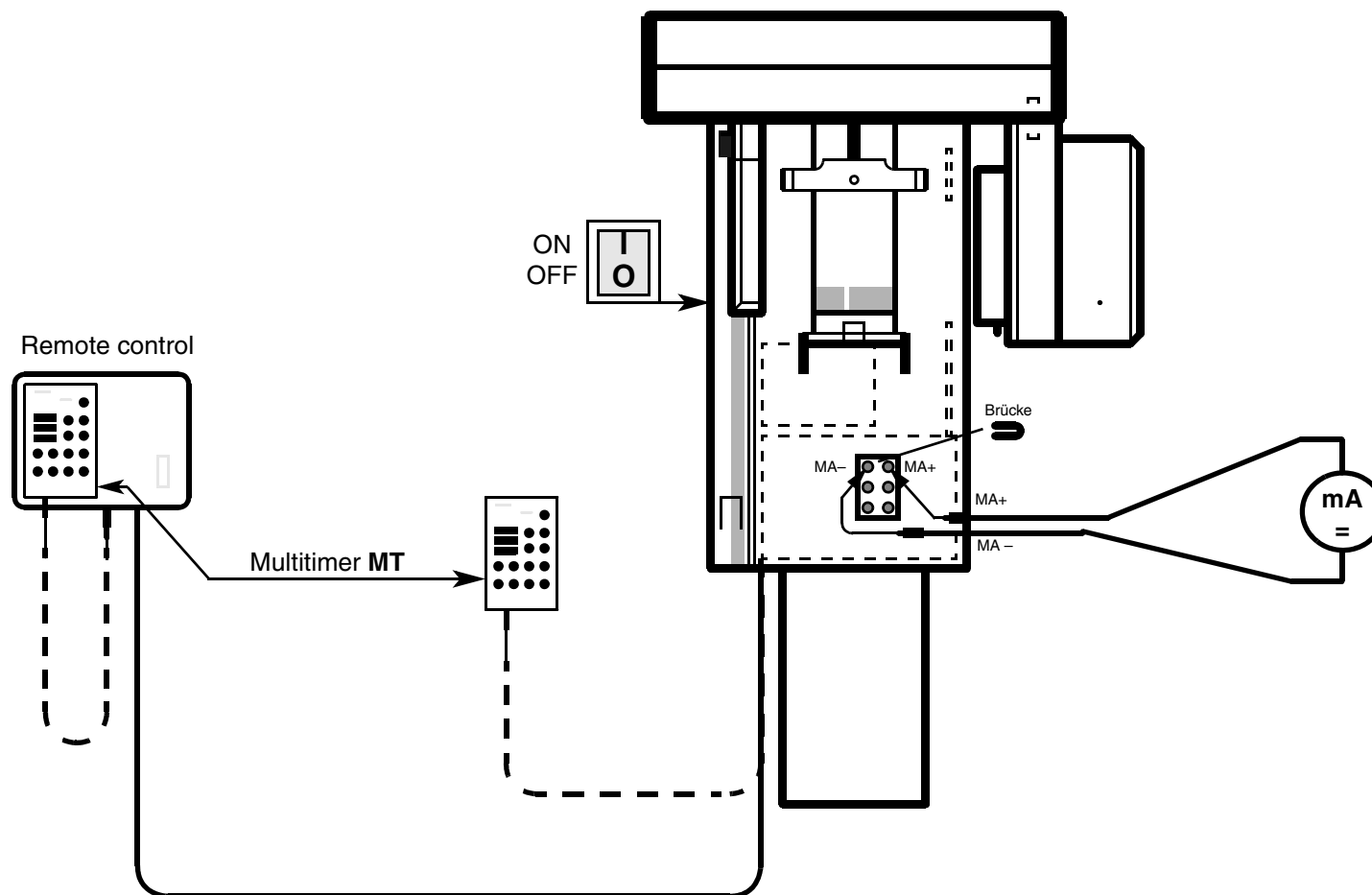
**Terminate**

**If the service password is requested the current system date (the first four digits) must be entered in reverse order (see SIDEXIS Service Manual).**

E.g. 24.05 1995 becomes 5042



## 5.2 Setting exposure readiness on the PC







- **Radiation without rotation can be released with Service routine S.01.**

Additionally with ORTHOPHOS Plus DS: set readiness for exposure as described in section 'Setting exposure readiness on the PC'. Select **Factory service (2)** or **set the Active signal internally with Service Routine S.35, test step 02.**

1. Select Service routine **S.01** as described in section '**Selecting service routines**'.

2. Then briefly press the service key .  
The kV display indicates **00**.

3. Enter service code **01** with the + key.

4. Then briefly press the service key .  
The values on the kV/mA display flash. The kV values can now be altered.  
The LEDs above the patient symbol keys light up.

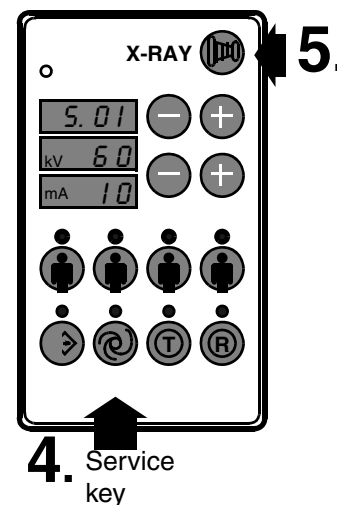
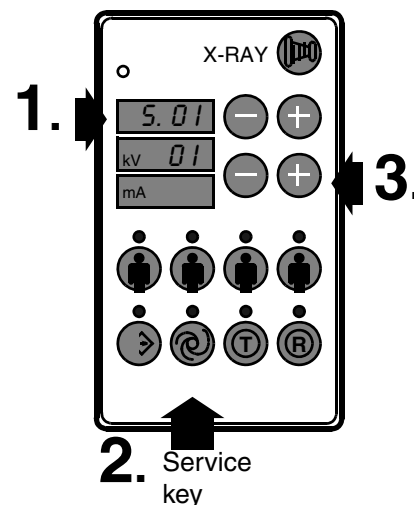
5. **RADIATION** can now be generated.  
The actual radiation time is displayed after releasing the exposure button.

The radiation time is limited to a maximum of 14 seconds.

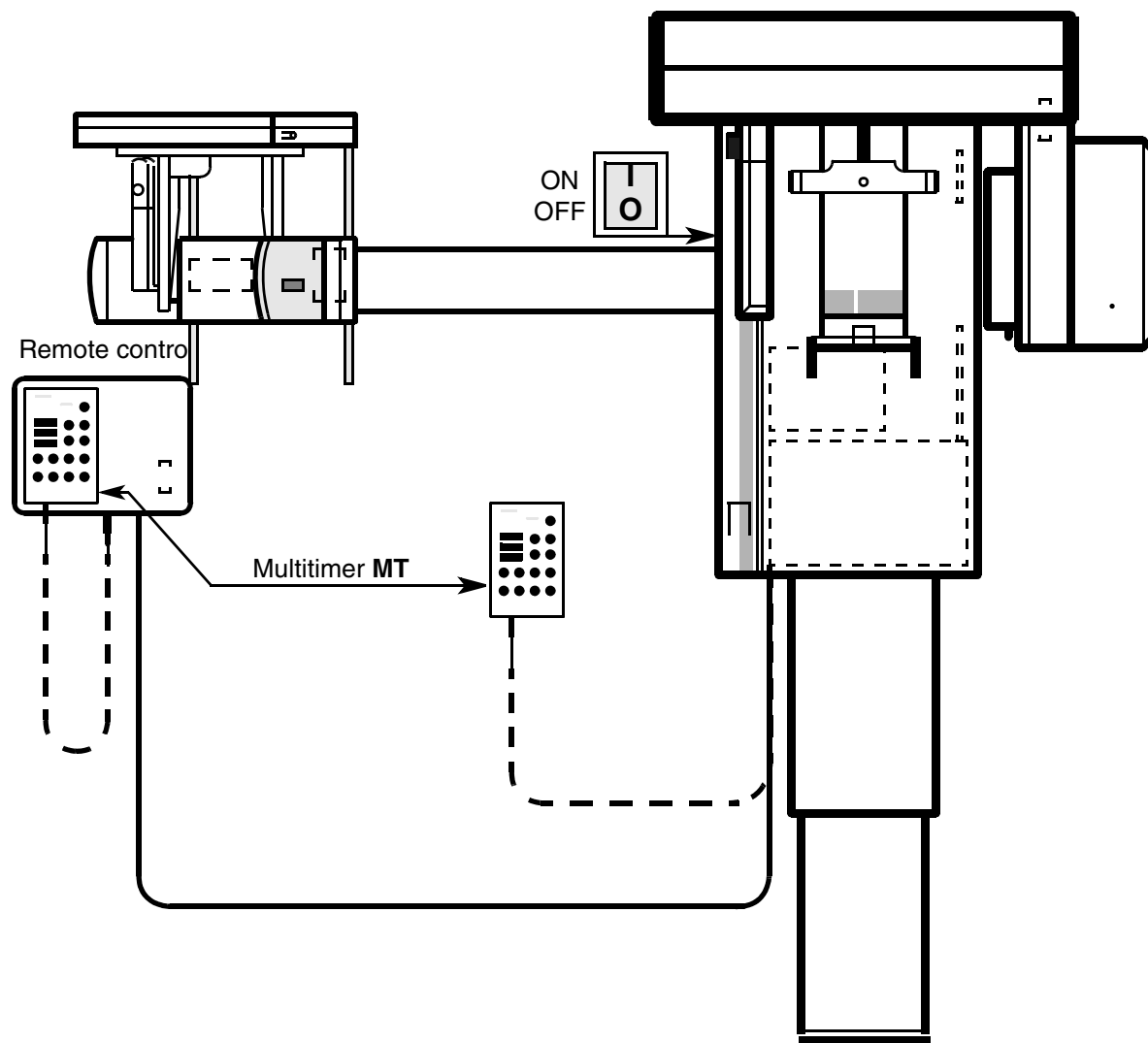
The maximum radiation time of 14 seconds lights up. Press the R key.

If an exposure is released during the cool-down period, the elapsing cool-down time is displayed (automatic exposure blockage). During this time the LED above the R key flashes.

Briefly press the service key . The Service routine S.01 is terminated.







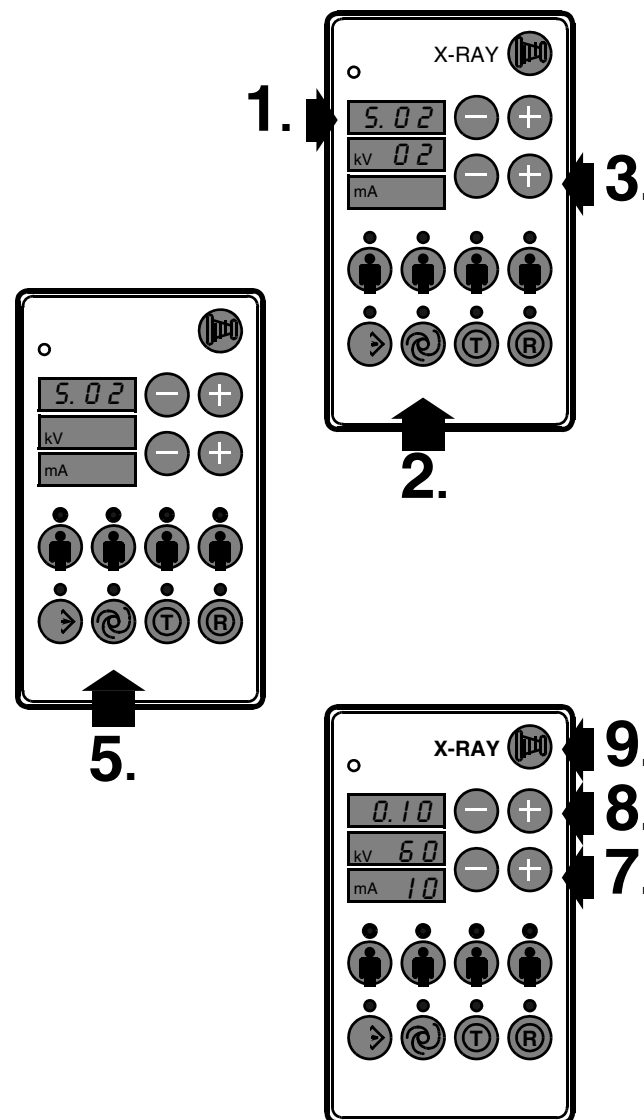
## 5.3 Service routine S.01 Radiation without rotation



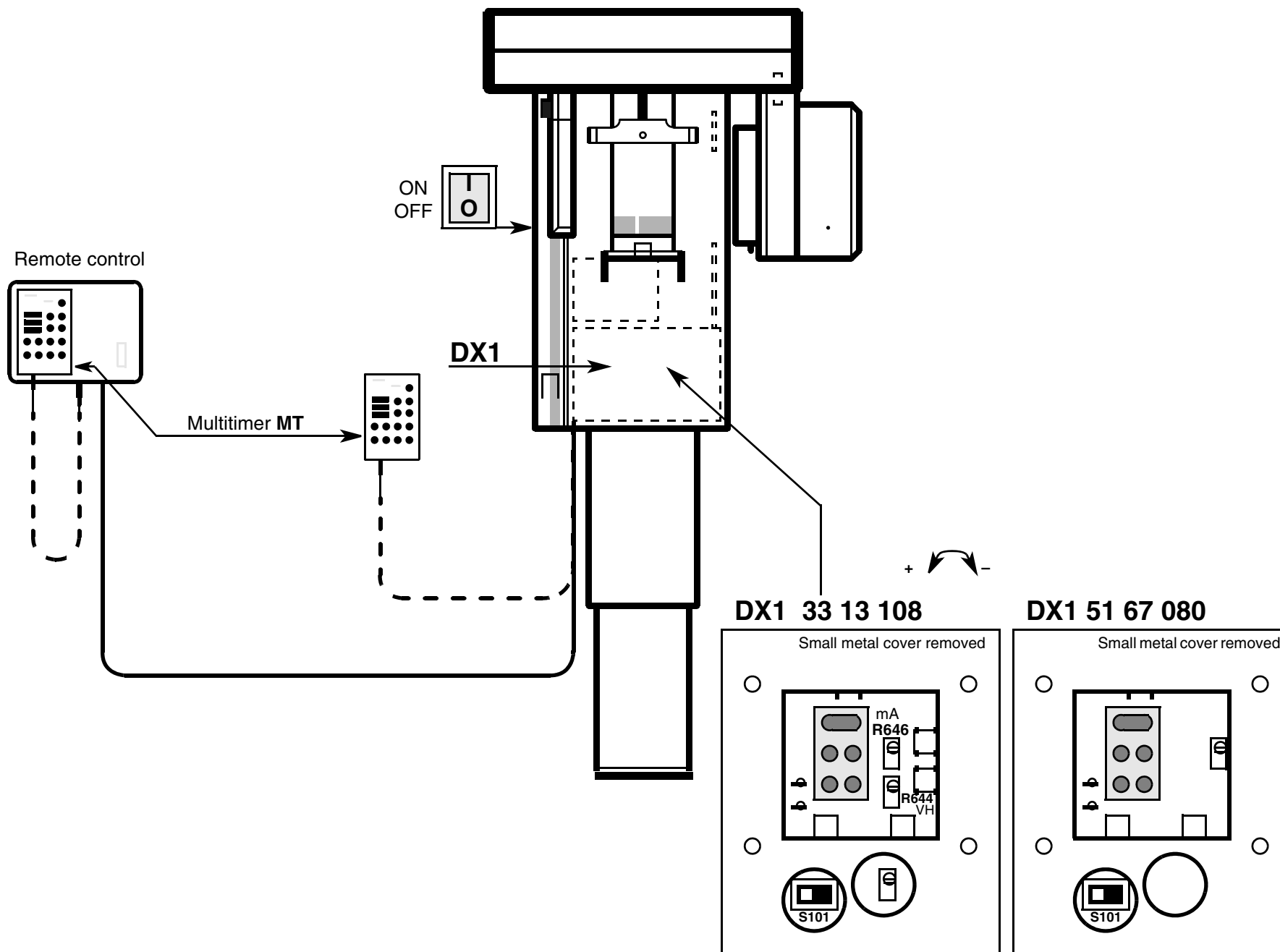
- **Radiation without rotation and with exposure times for cephalometry can be released with Service routine S.02.**

Additionally for ORTHOPHOS Plus DS: set readiness for exposure as described in section **Setting exposure readiness on the PC'**. Select **Factory service (2)** or **set the Active signal internally with Service Routine S.35, test step 02.**

1. Select Service routine **S.02** as described in section "Selecting service routines".
2. Briefly press the service key .  
The kV display indicates **00**.
3. Enter service code **02** with the + key.
4. Briefly press the service key .  
Test step **01** appears on the mA display.  
ORTHOPHOS Plus DS Ceph: adjust the diaphragm.  
ORTHOPHOS 5/Plus: select Pan or Ceph diaphragm.  
**NOTE:**  
In **test step 01**: Radiation can be released in any position of the X-ray tube assembly.  
In **test step 02**: Radiation can be released in the cephalometry position of the X-ray tube assembly.  
Test step 02 can be selected with the + key for kV adjustment.  
To exit a test step briefly press the service key .
5. Briefly press the service key .  
The values on the kV/mA display flash.  
The LEDs above the patient symbol keys light up.
6. Essential for test step 02: move the image receptor to the cephalometry position and then press the Return key R. The X-ray tube assembly then travels to the cephalometry position.
7. Select the kV step.
8. Select the exposure time. Permissible times are 0.1 to 4.0 seconds for ORTHOPHOS 5 / Plus  
4 seconds for ORTHOPHOS Plus DS Ceph.
9. Switch **RADIATION** on.  
The actual radiation time is indicated after releasing the exposure button.  
If an exposure is released during the cool-down period, the elapsing cool-down time is displayed (automatic exposure blockage). During this time the LED above the R key flashes.  
Acknowledge the radiation time with the R key.



## 5.4 Service routine S.02 Radiation without rotation for Ceph



## To exit the service routines switch the unit OFF and ON again.

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- The setpoints for kV, mA and preheating VH can be checked and adjusted with Service routine S.03.

Procedure during adjustment:

For **DX1** 33 13 108 with potentiometer

Select Service routine **S.03** test step **04** and delete **offset only**.









Perform Service routine **S.03** test step **02**.

Perform Service routine **S.03** test step **03**, adjust with potentiometer R644 **5,5V**.

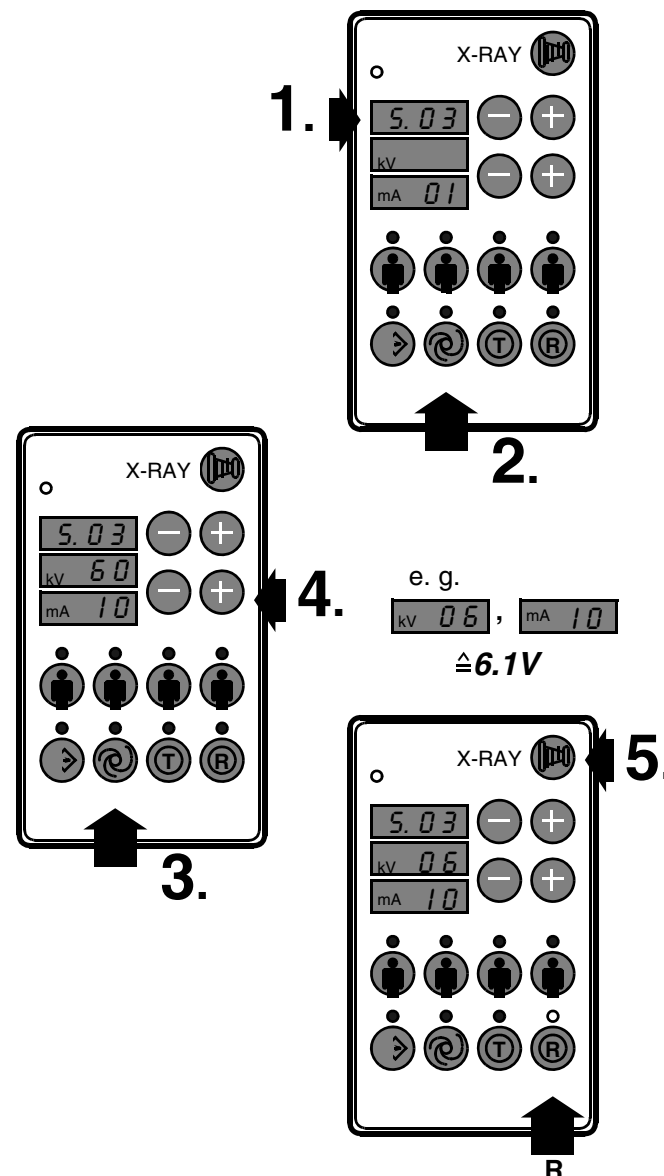
For **DX1** 51 67 080

Perform Service routine **S.03** test step **04** completely.

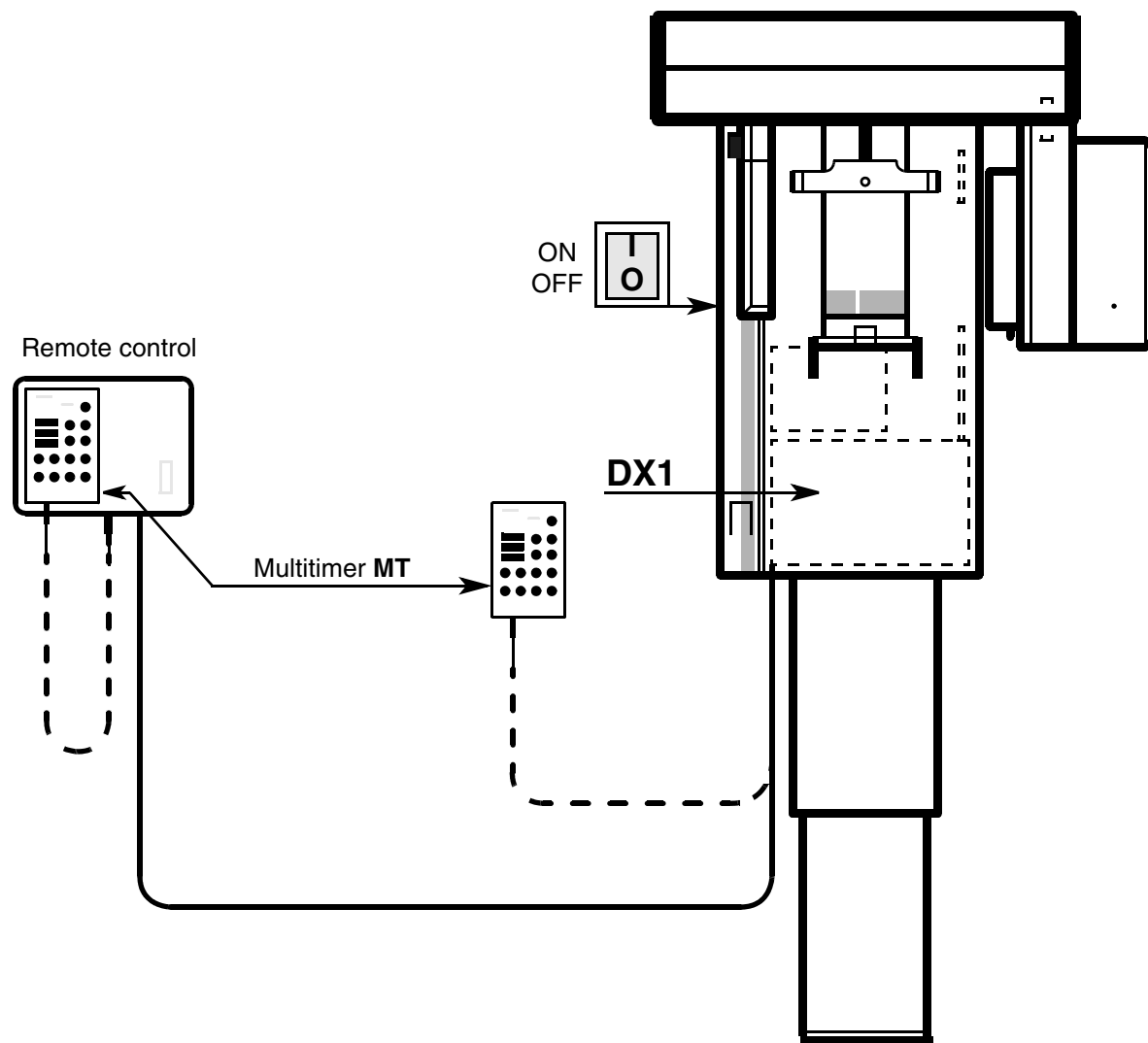
Additionally for ORTHOPHOS Plus DS: set readiness for exposure as described in section **Setting exposure readiness on the PC**. Select **Factory service (2)** or **set the Active signal internally with Service Routine S.35, test step 02**

- Select Service routine **S.03** as described in section 'Selecting service routines'.
- Briefly press the service key . The mA display shows the step **01**.  
The kV setpoint is checked **in test step 01. kV setpoints:**  
 $6.0 \text{ V} \pm 0.1 \text{ V} \triangleq 60 \text{ kV}$   
 $9.0 \text{ V} \pm 0.2 \text{ V} \triangleq 90 \text{ kV}$
- Briefly press the service key . The values on the kV/mA display light up.
- Set the kV value with the + key (example in figure: 60 kV).
- Press the exposure button (hold it pressed; when releasing it the last value is displayed). The setpoint is displayed in four digits on the kV/mA display (example in figure: 06,10). The LED above the R key flashes. Press the R key; another kV value can now be tested. An audible signal may indicate the end of measurement.
- Briefly press the service key . The next test step appears.  
The mA setpoint is checked **in test step 02. mA setpoint**  
 $4.5 \text{ V} \pm 0.1 \text{ V} \triangleq 9 \text{ mA}$   
 $8.0 \text{ V} \pm 0.1 \text{ V} \triangleq 16 \text{ mA}$
- Briefly press the service key . The values on the kV/mA display light up.
- Press the exposure button (hold it pressed; when releasing it the last value is displayed). The mA setpoint is displayed in four digits on the kV/mA display. Check at both limits. Adjustments can be made with potentiometer **R 646** +  - on board DX1 (only with deleted offset).
- Briefly press the service key . The next test step appears.  
The VH setpoint is checked **in test step 03. VH setpoint: 05.50 ± 0.30 at 60/61kV/9mA.**
- Briefly press the service key . The values on the kV/mA display light up. Press the exposure button (hold it pressed; when releasing it the last value is displayed). The VH setpoint is displayed in four digits on the kV/mA display. **VH setpoint: 05.20 V to 05.80 V. Adjustment can be made** with potentiometer **R 644** +  - on board DX1 (basic adjustment 5.5V; only with deleted offset).

continued on next page



## 5.5 Service routine S.03 Setpoints: kV, mA, preheating





### Continued

Setpoint alignment is executed automatically **in test step 04**, from Point 10 only possible from software version V025 (ORTHOPHOS Plus DS) and with DX1 51 67 080.

6. Briefly press the service key . The memory LED flashes and the kV/mA display indicates **FF**.

### Deleting the previous offsets:



7. Press the memory key (LED stops flashing). The LED above the R key flashes.
8. Press the Return button R (LED stops flashing). The LED above the service key  lights up. The kV/mA display indicates **00**.
9. Briefly press the service key .  
The display for program / radiation time shows **S\_1** and **00** on the kV display.  
The program is ready for the automatic setpoint alignment. (Pressing the service key at this point causes the test step to be exited with the offsets deleted.)

### Performing the automatic setpoint alignment:

(only permissible from software version V025 (ORTHOPHOS Plus DS) and with DX1 51 67 080)

10. Press the exposure button and hold it pressed until **11 11** lights up on the kV/mA display and the LED above the memory key flashes.  
The alignment process is executed automatically.

### Storing the alignment values:

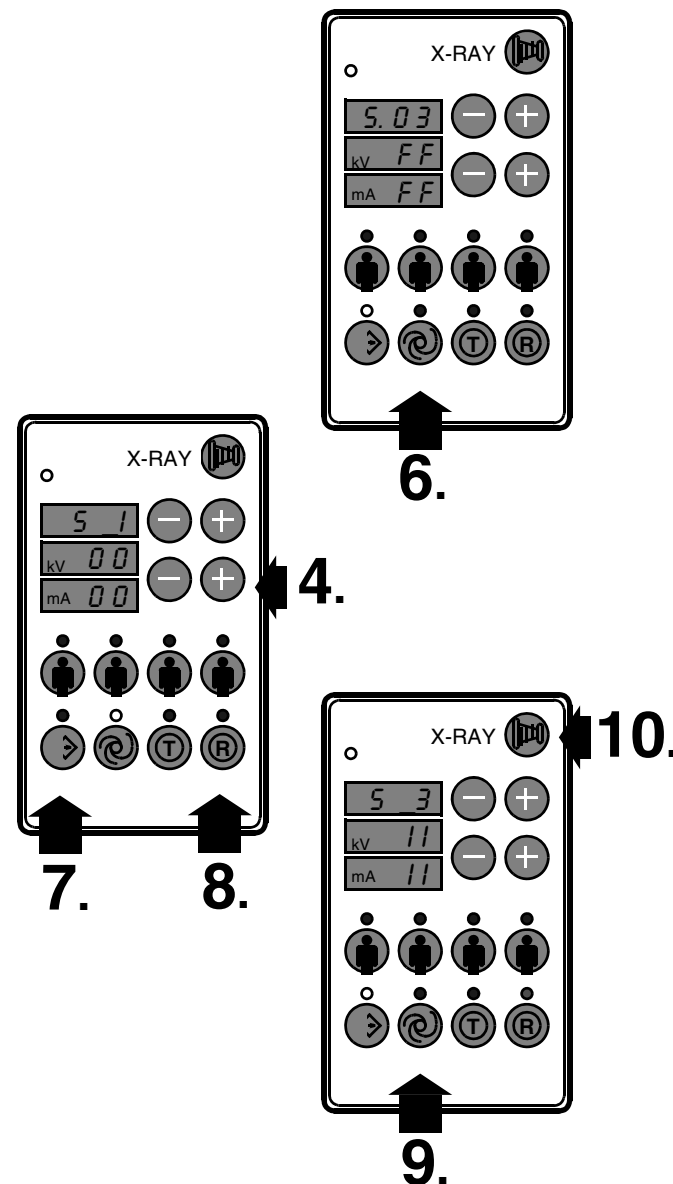
- Press the memory key (LED stops flashing). The LED above the R key flashes.
- Press the Return key R (LED stops flashing). The LED above the service key  lights up.
- Press the service key .

### Information about the displays during the automatic alignment.

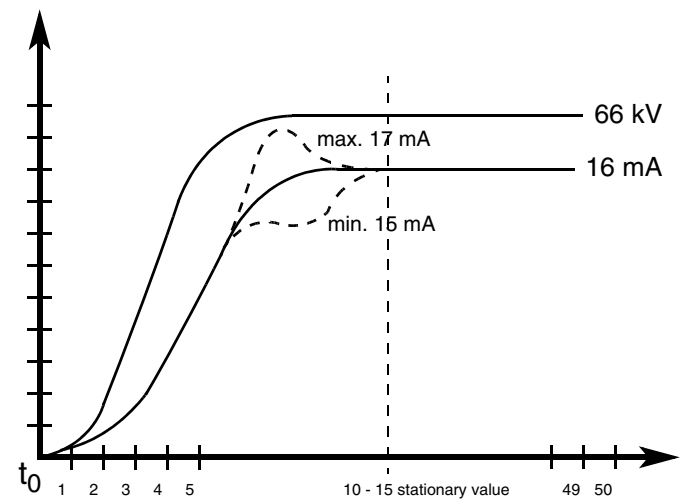
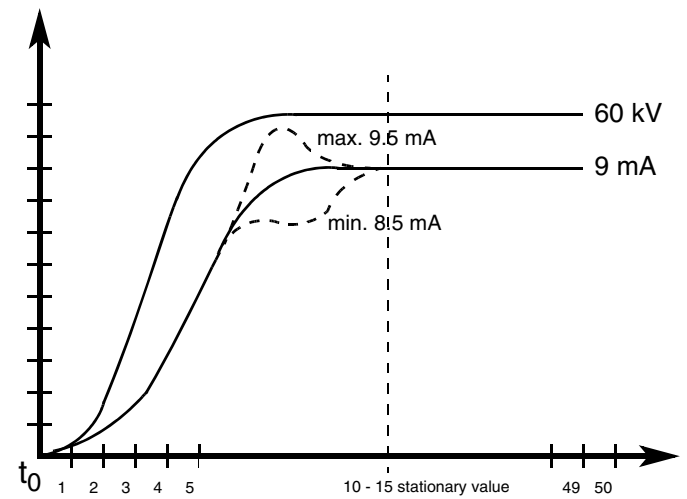
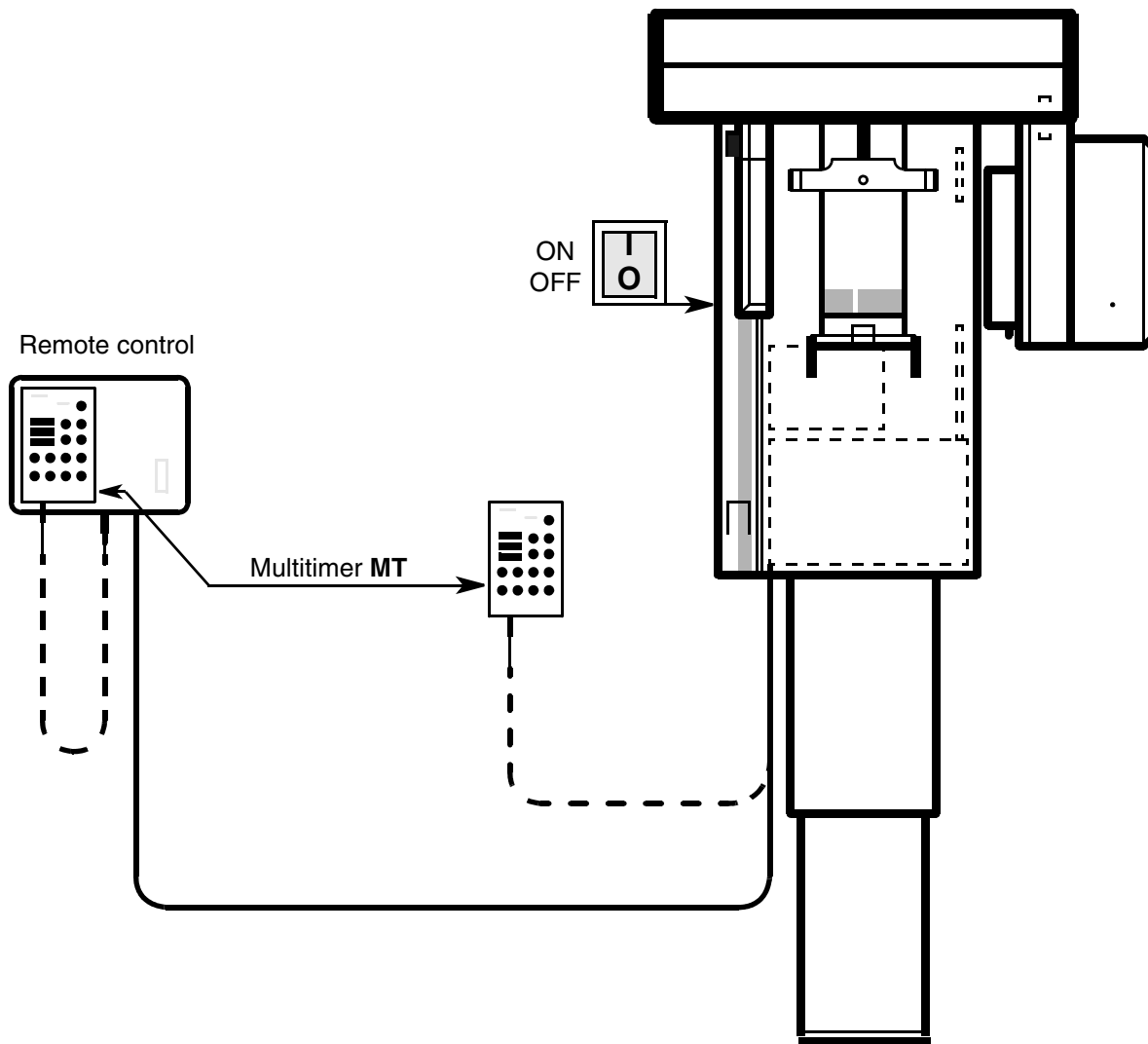
Program/radiation time display: Step number of the currently active alignment parameter  
S\_1: kV alignment is active  
S\_2: mA alignment is active  
S\_3: VH alignment is active

kV display: Consecutive number of alignment attempts within the test step number.

kV/mA display: Following the completed alignment within one test step, all kV/mA steps are selected one after the other and the error of the actual value is tested.



## 5.5 Service routine S.03 Setpoints: kV, mA, preheating





50 values are measured in intervals of 2 ms.  
The measured values can be plotted as dots to check the transient characteristics.





- The actual values of kV, mA and preheating VH can be checked with **Service routine S.4**.

Additionally for ORTHOPHOS Plus DS: set readiness for exposure as described in section **Setting exposure readiness on the PC**. Select **Factory service (2)** or set the **Active signal internally with Service Routine S.35, test step 02**

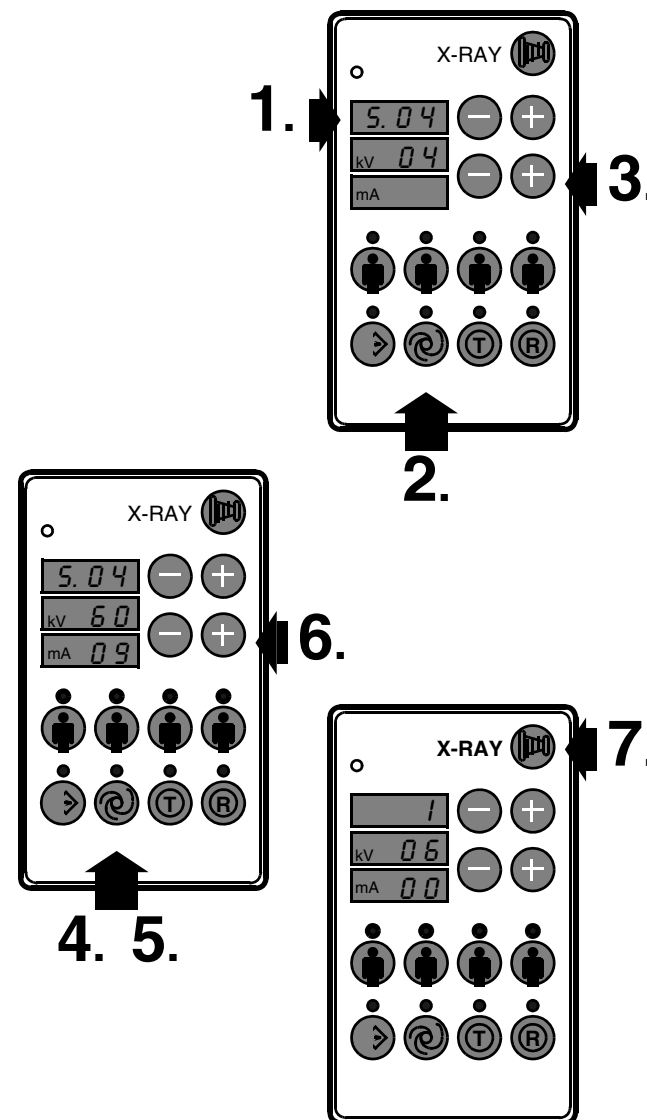
1. Select Service routine **S.04** as described in section '**Selecting service routines**'.
2. Briefly press the service key . The kV display indicates 00.
3. Enter service code **04** with the + key.
4. Briefly press the service key . Test step 01 is indicated on the mA display.

The actual kV value is checked **in test step 01**. **kV actual value:** stationary kV value  $\pm 0.20$  V **06.00 V**  $\pm 0.2$  V  $\hat{=}$  **60 kV** after the tenth measured value.

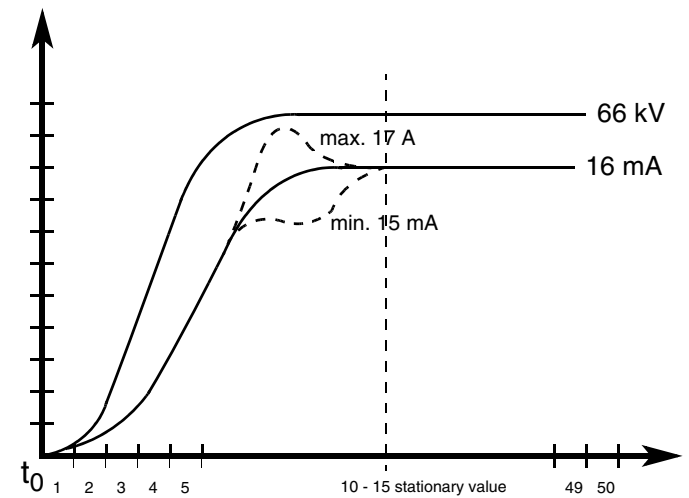
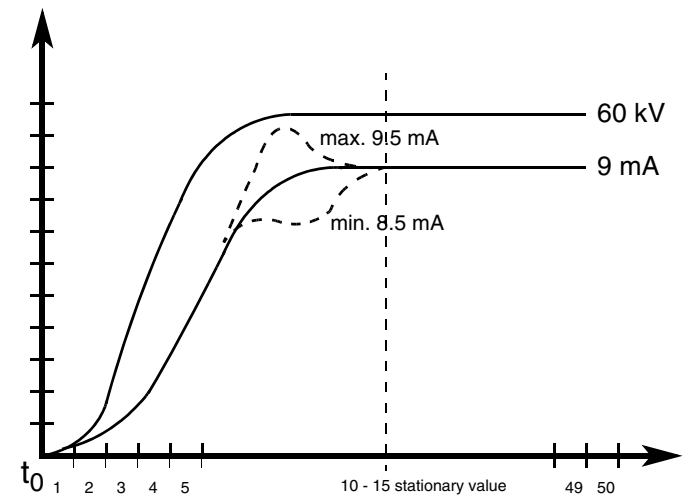
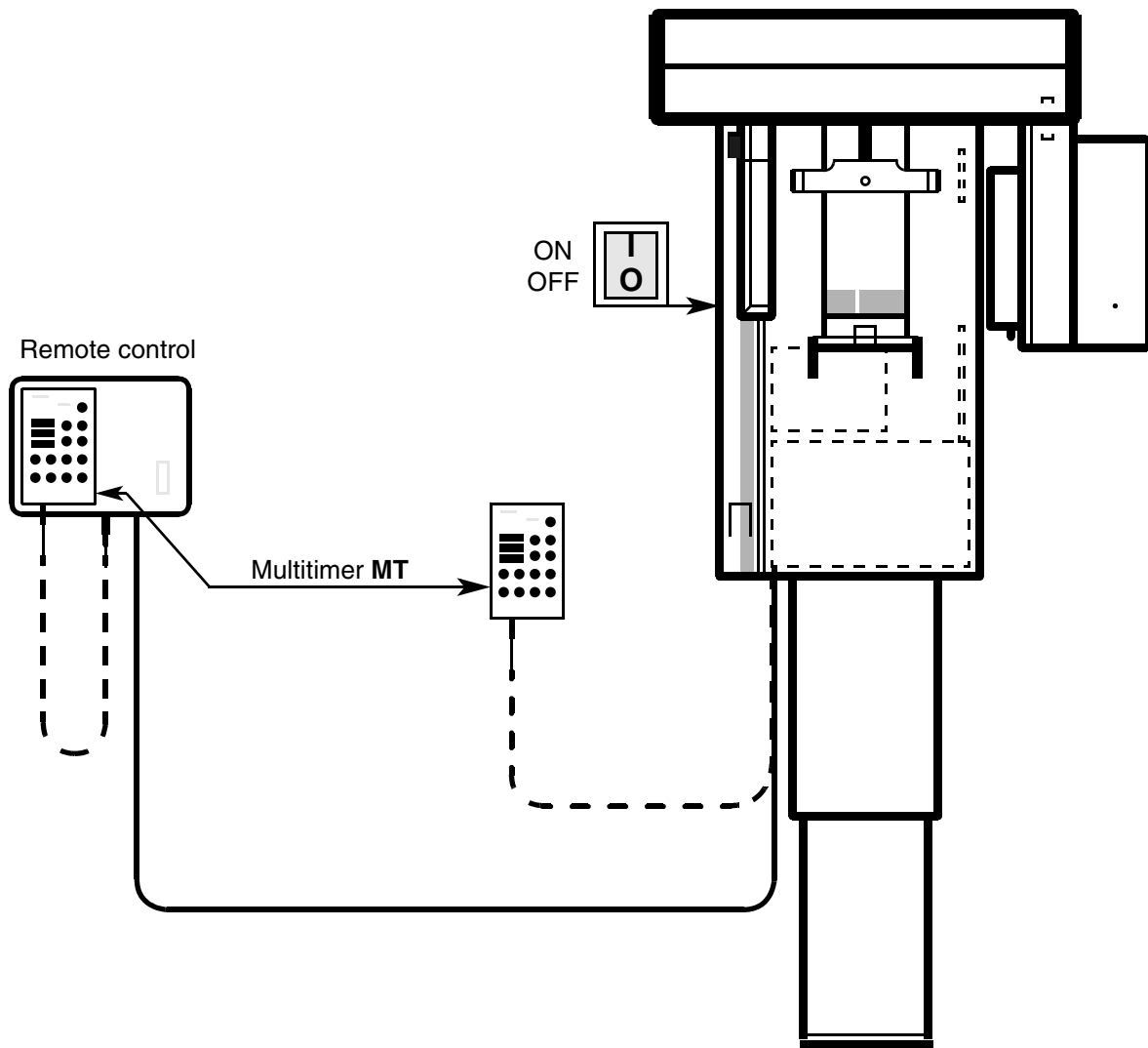
5. Briefly press the service key . The values on the kV/mA display flash. The LEDs above the patient symbol keys light up.
6. Select the kV value. Example in figure: 60kV/9mA
7. Press the exposure button and hold it pressed. **RADIATION** is generated for 0.1 second.

- The actual value is displayed in four digits on the kV/mA display:  
Example in figure **06.00 V**  $\pm 0.2$  V  $\hat{=}$  **60 kV** after the tenth measured value.  
The stationary value is:  $\pm 0.20$  V.
- A maximum of 50 measured values can be recalled with the  $- / +$  (kV) keys.  
An additional kV value can be entered for the test after pressing the R key.
- Briefly press the service key . The next test step appears.

continued on next page





## 5.6 Service routine S.04 Actual values: kV, mA, preheating





50 values are measured in intervals of 2 ms.  
The measured values can be plotted as dots to check the transient characteristics

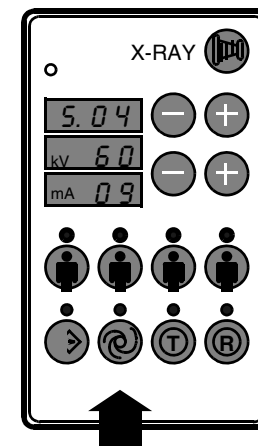
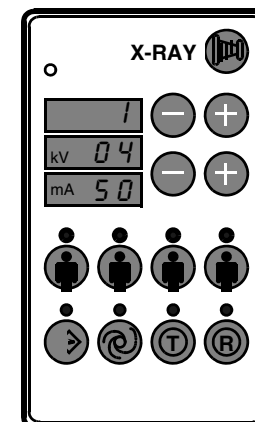
**Continued**

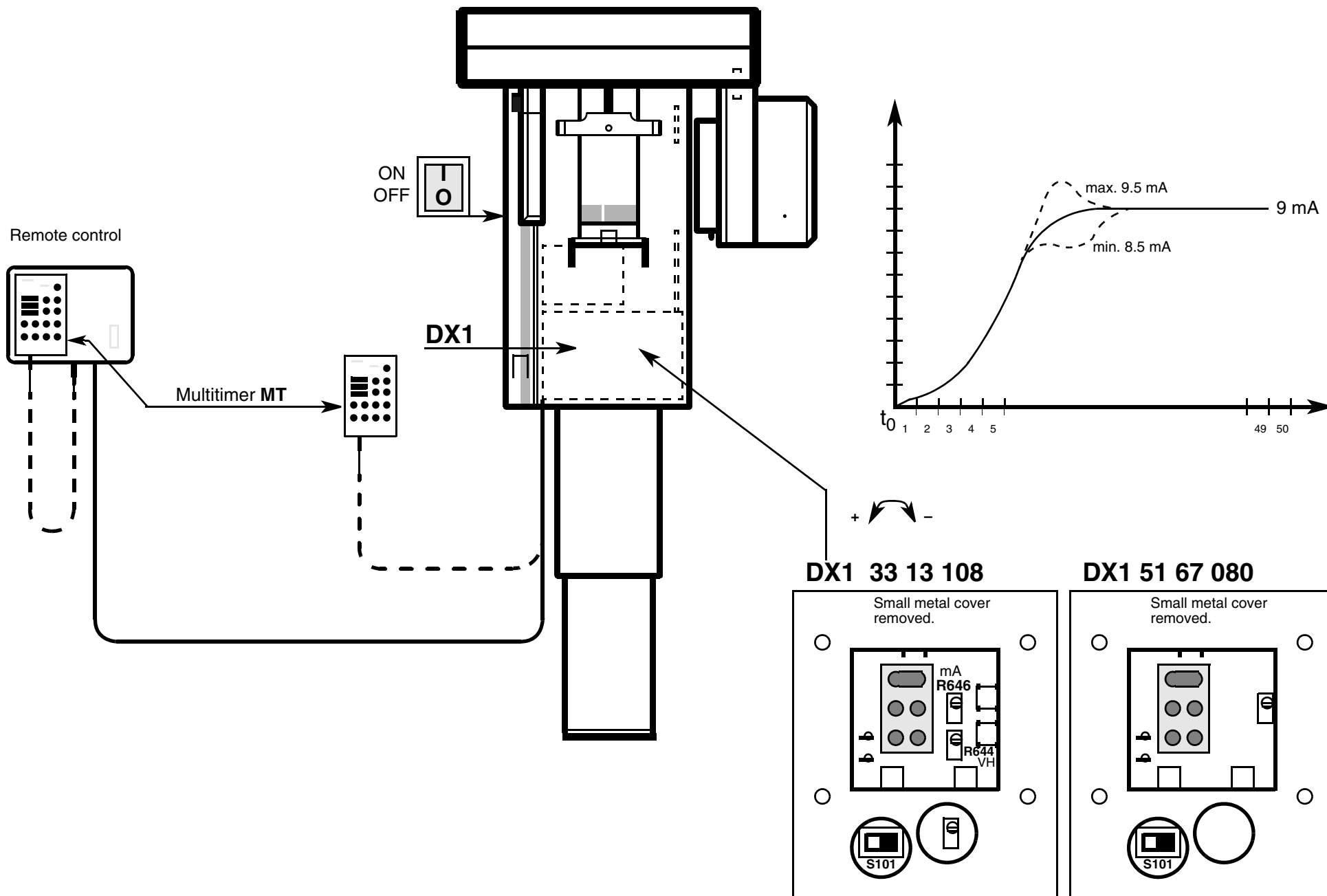
The actual mA value is checked **in test step 02**.

8. Briefly press the service key . The values on the kV/mA display flash. The LEDs above the patient symbol keys light up.
9. Select the kV value. Example in figure: 60kV/9mA
10. Press the exposure button and hold it pressed. **RADIATION** is generated for 0.1 seconds.
  - The actual value is displayed in four digits on the kV/mA display:  
After the 10th measured value: **actual mA value**  $4.5 \text{ V} \pm 0.1 \text{ V} \hat{=} 9 \text{ mA} \pm 0.2 \text{ mA}$   
Check again with 66kV/16mA ( $8.0 \text{ V} \pm 0.1 \text{ V} \hat{=} 16 \text{ mA} \pm 0.2 \text{ mA}$ )
  - A maximum of 50 measured values can be recalled with the -/+ (kV) keys.  
An additional kV value can be entered for testing after pressing the R key.  
If you do not wish to check any more mA actual values, briefly press the service key .  
The next test step then appears.

The actual VH value is checked **in test step 03**. **VH actual value:** stationary setpoint  $\pm 0.30$




11. Then briefly press the service key . The values on the kV/mA display flash. The LEDs above the patient symbol keys light up.
12. Select the kV value. Example in figure: 60kV/9mA
13. Press the exposure button and hold it pressed. **RADIATION** is generated for 0.1 second.
  - The actual value is displayed in four digits on the kV/mA display:  
**VH actual value:** **05.20 to 05.80** (at setpoint 05.50) after the 25th measured value.
  - A maximum of 50 measuring values can be recalled with the -/+ (kV) keys.  
An additional kV value can be entered for the test after pressing the R key.  
If you do not wish to check any more VH actual values, briefly press the service key .  
Test step 01 appears again.

**8./ 11.****9./12.****10./13.**




- Service routine S.5 is needed for the heating adjustment.



Additionally for ORTHOPHOS Plus DS: set readiness for exposure as described in section 'Setting exposure readiness on the PC'. Select **Factory service (2)** or set the **Active signal internally with Service Routine S.35, test step 02**.

1. Select Service routine **S.05** as described in section 'Selecting service routines'.
2. Then briefly press the service key . The kV display indicates **00**.
3. Enter the service code **05**. The kV display indicates **05**.
4. Briefly press the service key . Test step 01 is shown on the mA display.
5. Briefly press the service key . Test step 02 is shown on the mA display.

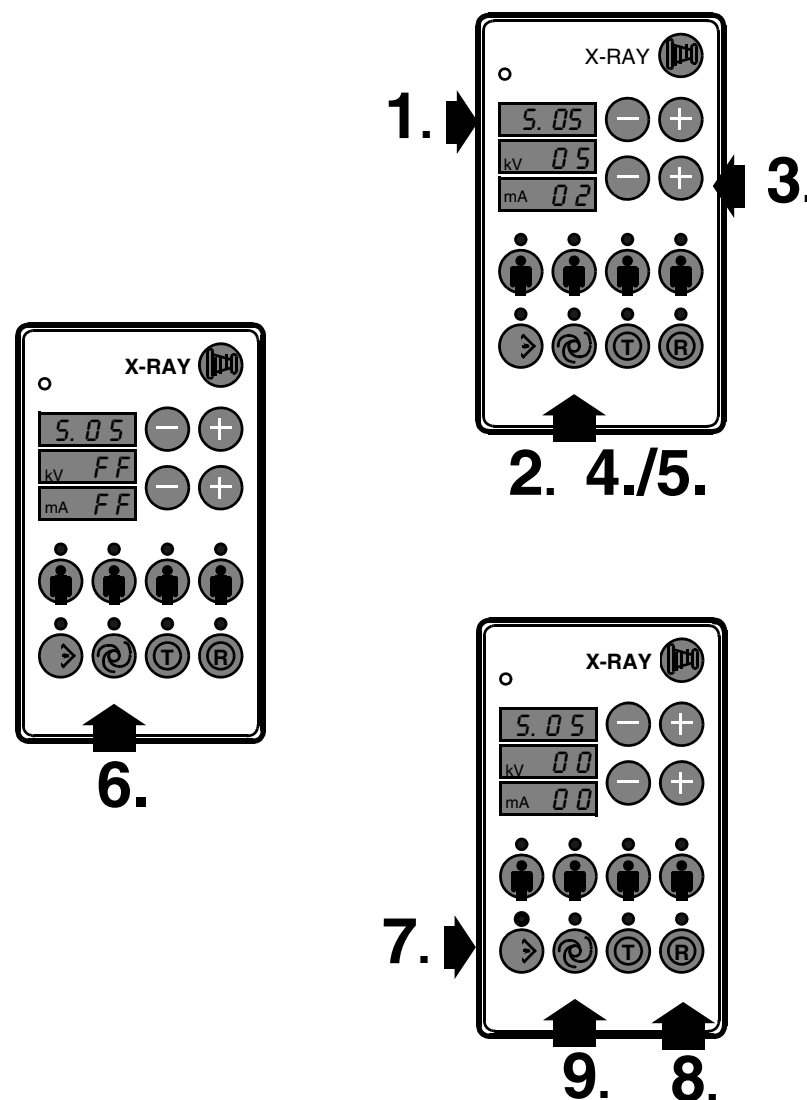
**Test step 02** from memory card version V025 (ORTHOPHOS Plus DS)

- Preheating is automatically adjusted with service routine **S.05**, test step **02**. Do not perform this test step before warm-up.
6. Briefly press the service key . **FF FF** appears on the kV/mA display. The LED above the memory key flashes.

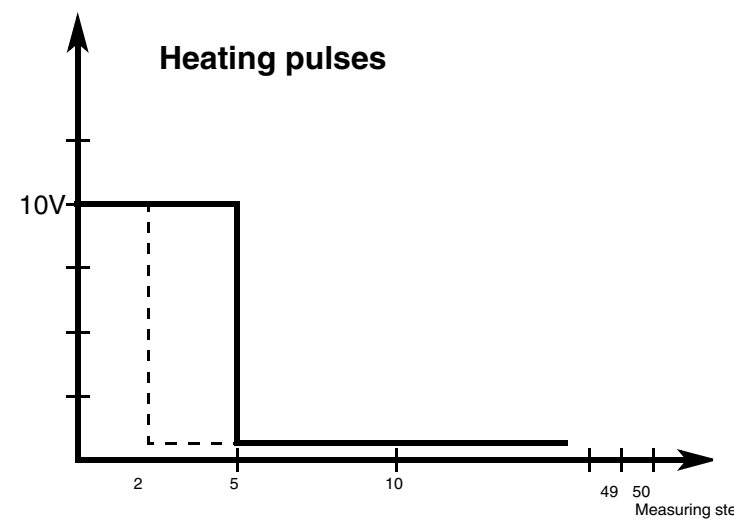
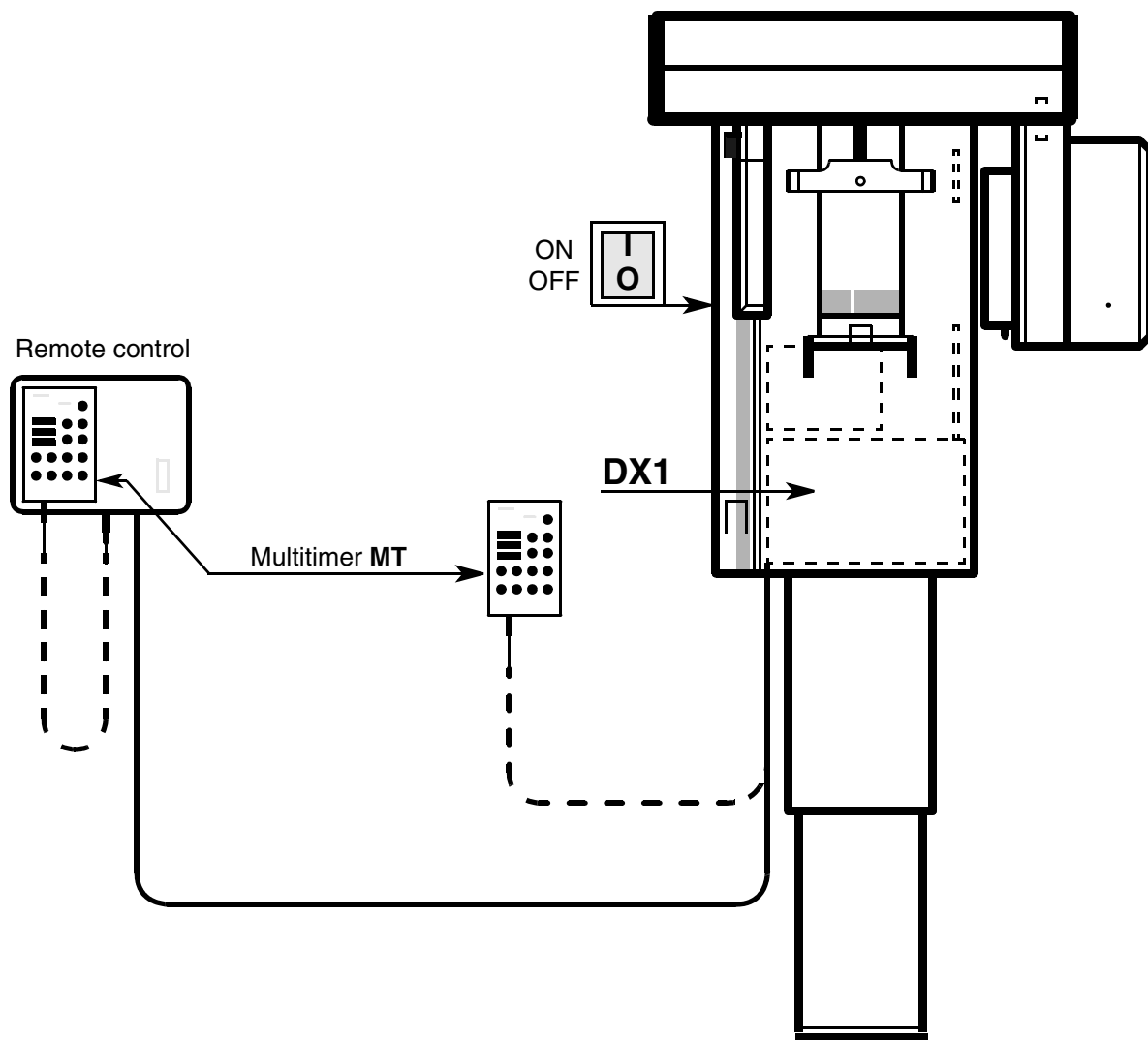
**Deletion of previous offset:**

7. Press the memory key. The LED above the R key flashes.
8. Press the Return key R. The kV/mA display indicates **00 00**. The LED above the service key  lights up.
9. Briefly press the service key . **60/09** flashes on the kV/mA display. The program is now ready for the automatic VH adjustment (pressing the service key again at this point causes the test step to be exited with the offsets deleted).

continued on next page





## 5.7 Service routine S.05 Heating adjustment




**Continued****Performing the automatic setpoint alignment:**

10. Press the X-ray key and hold it pressed until the kV/mA display shows **05 20 - 05 80**, for ORTHOPHOS Plus DS < V027 shows **11 11** and the LED above the memory key flashes. The alignment process is executed automatically.
- Starting with 1 second **RADIATION** to warm up the system there are several exposure releases with 100 msec radiation time each in order to optimize the preheating value. The cool-down intervals between radiation phases are indicated on the mA display, and the number of optimizing steps is indicated on the program/radiation time display.

**Storing the alignment values:**

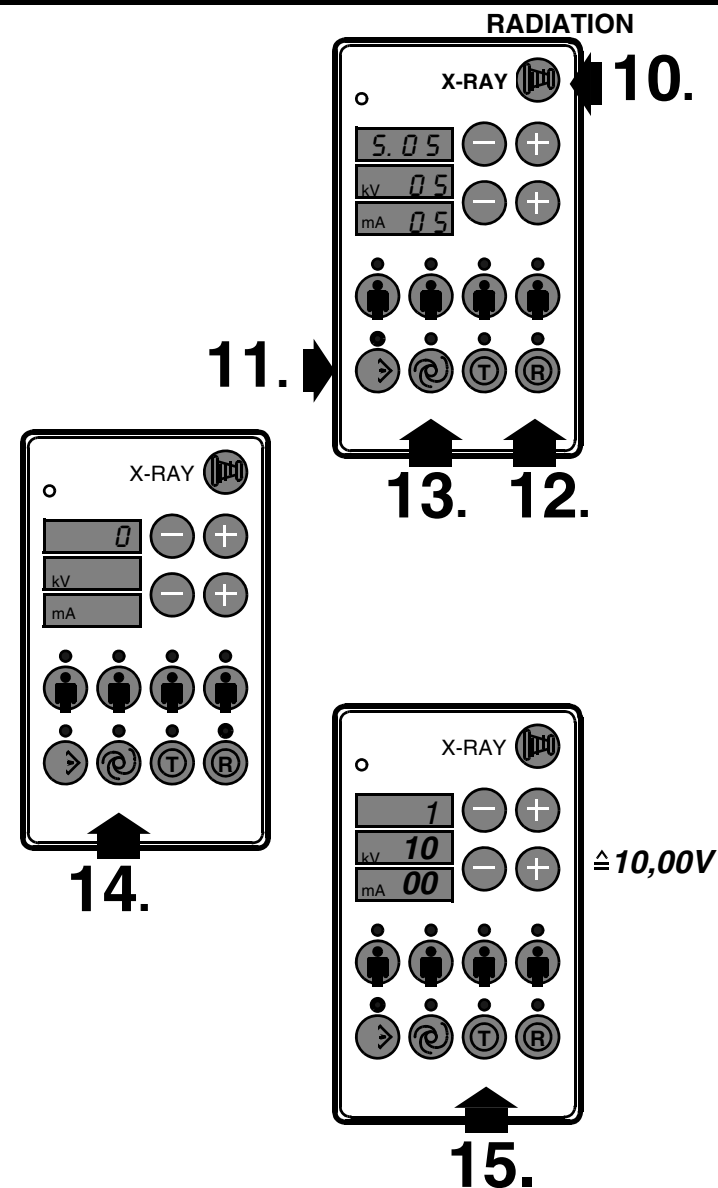
11. Press the memory key (LED stops flashing). The LED above the R key flashes.
12. Press the Return key R (LED stops flashing). The LED above the service key  lights up.
13. Press the service key  twice. The preheating value is now stored.

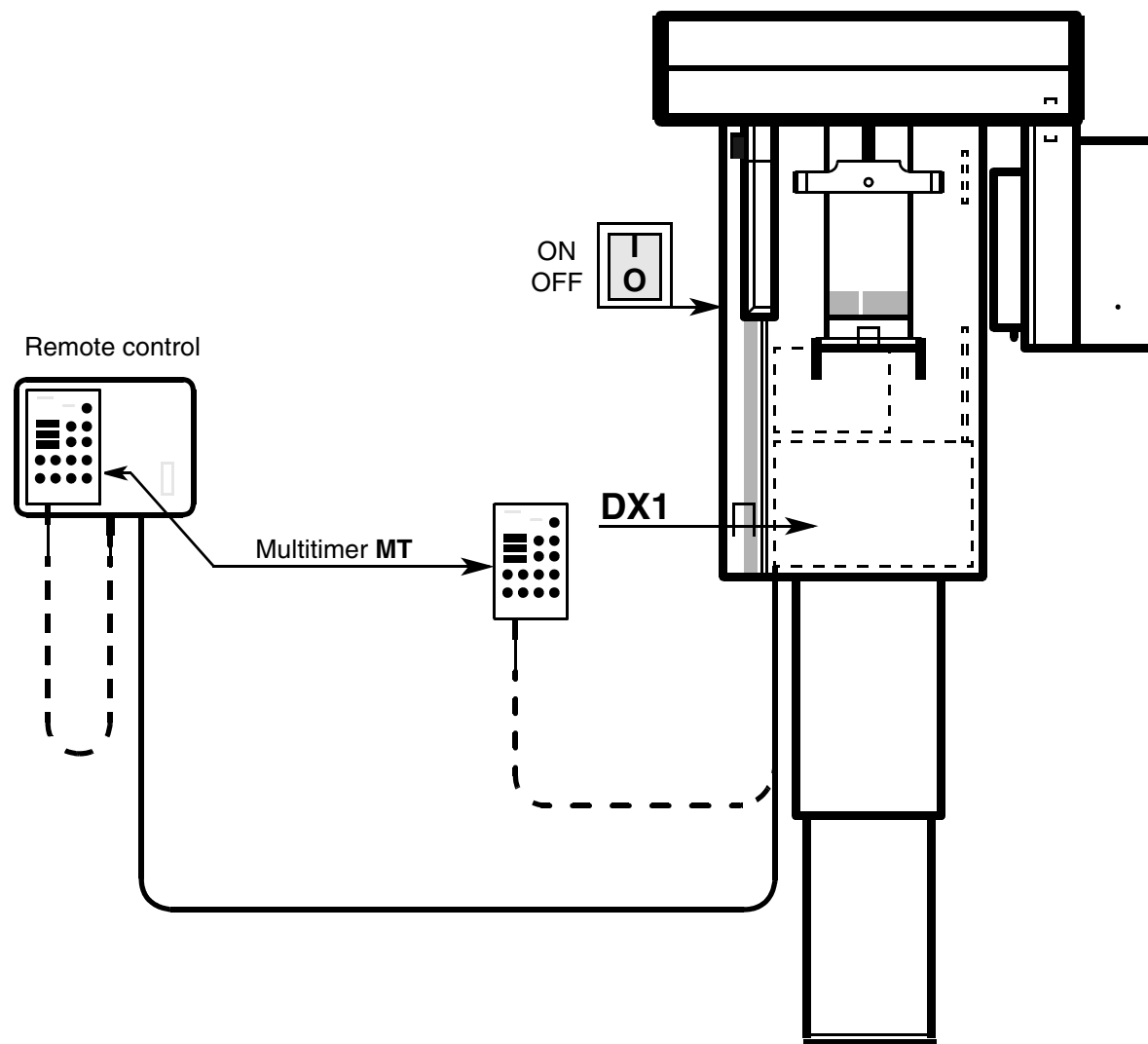
**Test step 03** from memory card version V026 (ORTHOPHOS Plus DS)

- Basic heating is checked with Service routine **S.05**, test step **03**.
14. Briefly press the service key . The program/radiation time display indicates **0**. The LED above the test rotation key lights up.
15. Press the test rotation key.

**After pressing the test rotation key, the following indications may appear:**

- The program/radiation time display indicates **1**, and the kV/mA display shows the voltage value. Ten voltage values can be called up with the kV/mA +/- keys (pulse sequence of basic heating). The first two measurements must be approximately **10.0V**, while the voltage must be about **0.0V** after the fifth measured value at the latest. If this change of signal is not clearly visible, the basic heating is faulty.
- The program/radiation time display indicates **0**, and the mA display shows **00**. The VH actual signal remains on low level - basic heating is faulty.
- The program/radiation time display indicates **0**, and the mA display shows **11**. The VH actual signal remains on high level - basic heating is faulty.

**5.7 Service routine S.05 Heating adjustment**









To exit the service routines switch the unit OFF and ON again.

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- The number of radiation releases can be determined with Service routine S.06.

1. Select Service routine **S.06** as described in section 'Selecting service routines'.
2. Briefly press the service key . The kV display indicates 00.
3. Enter the service code **06** with the + key.
4. Briefly press the service key . Test step 01 appears on the mA display.
5. Briefly press the service key . The memory LED flashes. The present count (max. 65535) is indicated on the program/kV/mA display.
6. Briefly press the service key . The next test step appears.

NOTE: Other test steps can be selected with the kV +/- keys.

- Press the memory key to reset the counter, the R LED flashes (with memory card versions > V26 ORTHOPHOS Plus DS). Press the Return key R. The display shows 00.

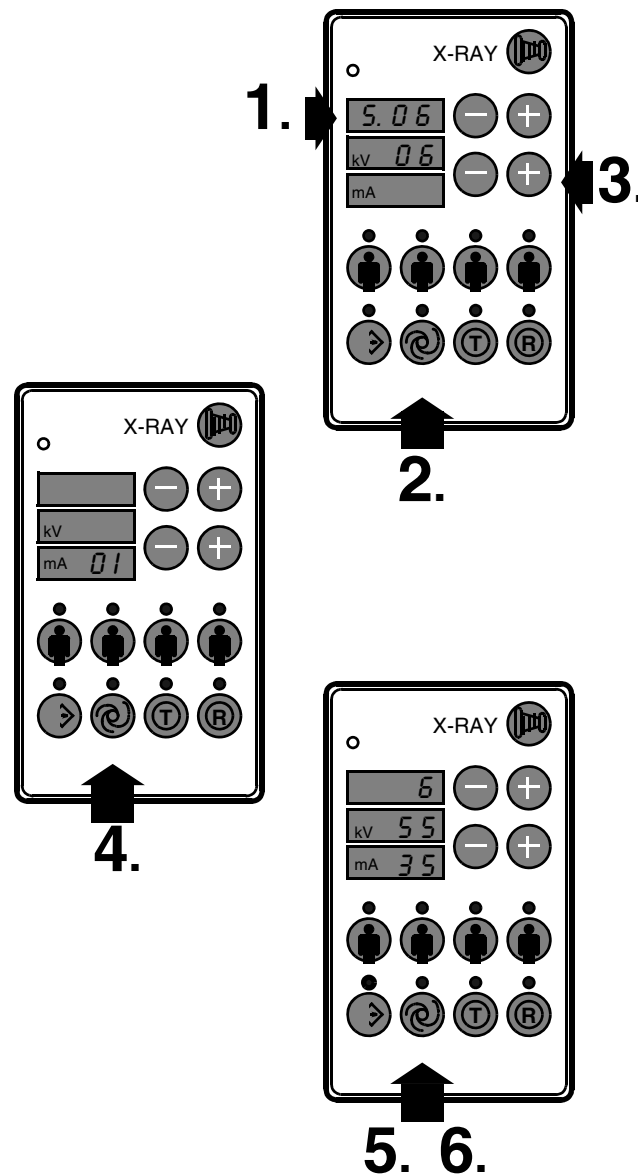
The Pan exposure counter is displayed in **test step 01**.

The Ceph exposure counter is displayed in **test step 02**.

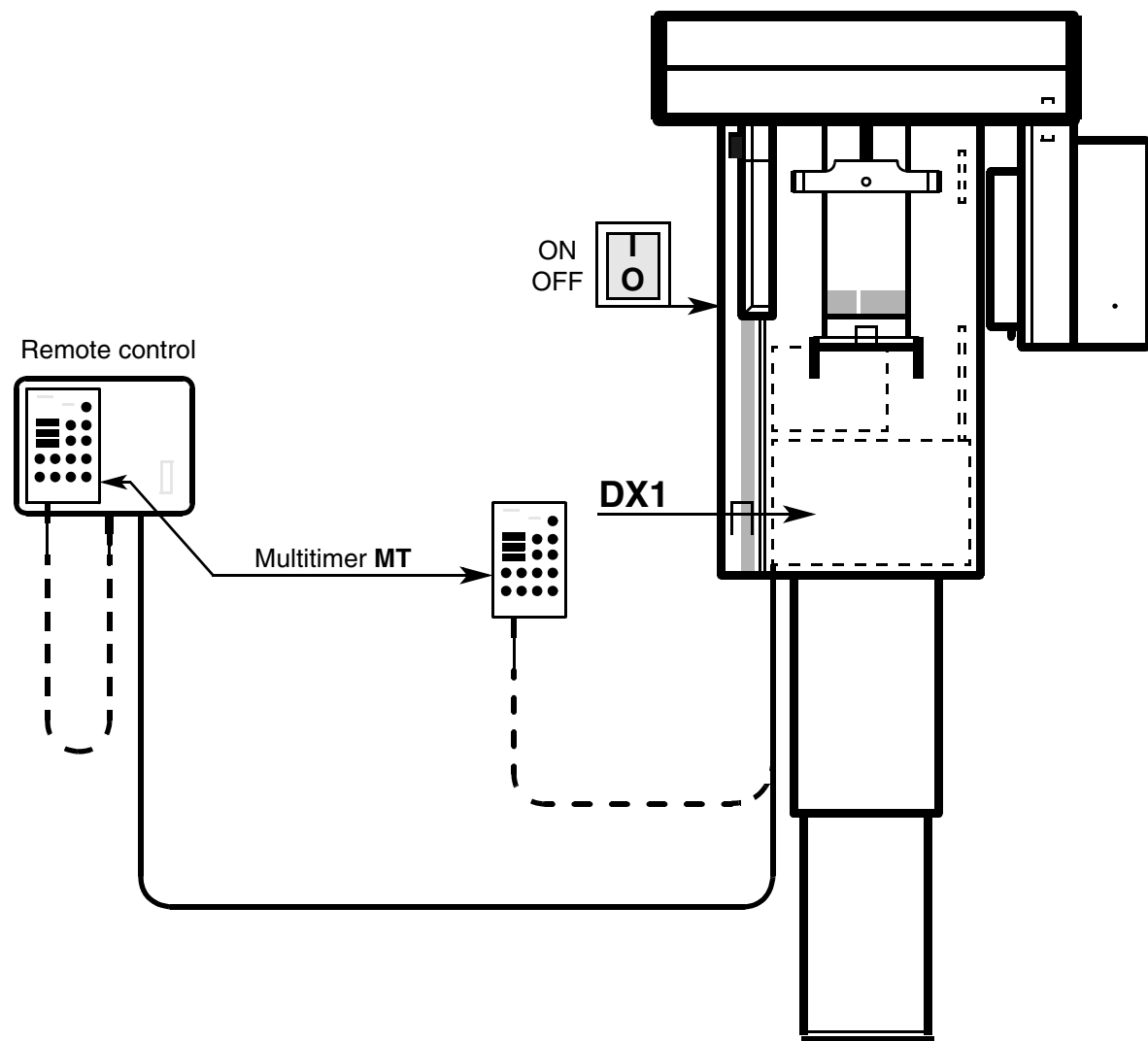
The total of all radiation releases is displayed in **test step 03** (including service exposures).

The total of all rotations is displayed in **test step 04**.

The total of all Ceph movements is displayed in **test step 05**.




## 5.8 Service routine S.06 Radiation counter (decimal display)




- The Service routine **S.07** is used to erase the contents of the EEPROM error memory on board DX1 after the X-ray tube assembly has been replaced.

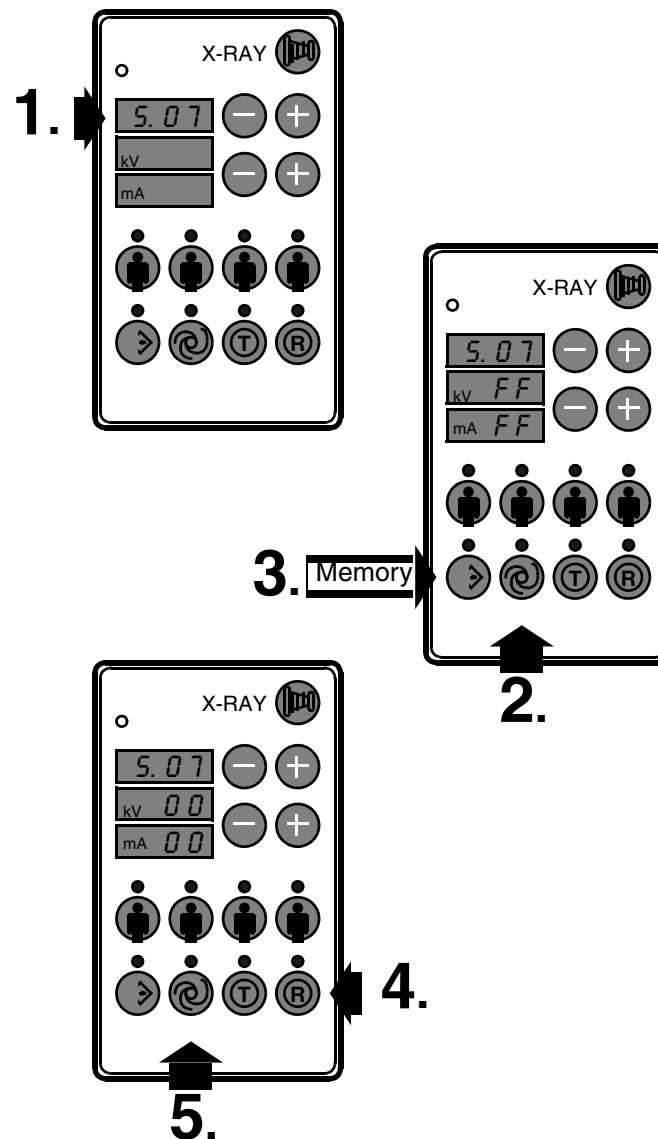
1. Select Service routine **S.07** as described in section 'Selecting service routines'.

2. Briefly press the service key .  
**FF FF** is indicated on the kV/mA display.  
The LED above the memory key flashes.

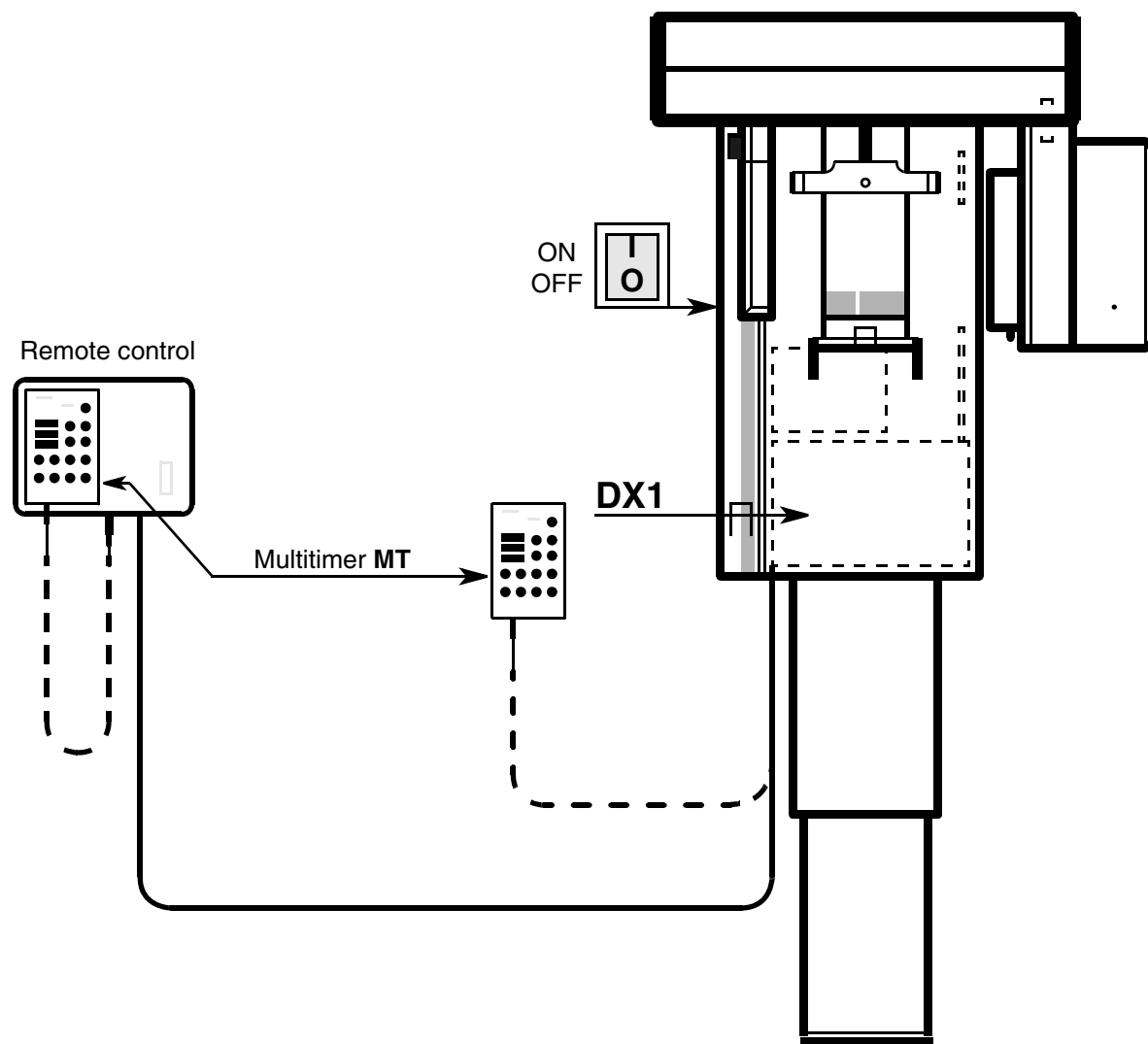
3. Press the memory key.  
The LED above the R key flashes.

4. Press the Return key R.  
With Service routine **S.07** the error memory is erased.  
The kV/mA display indicates **00 00**.  
The LED above the service key  lights up.




5. Briefly press the service key . This completes the test.




## 5.9 Service routine S.07 Erasing the error memory



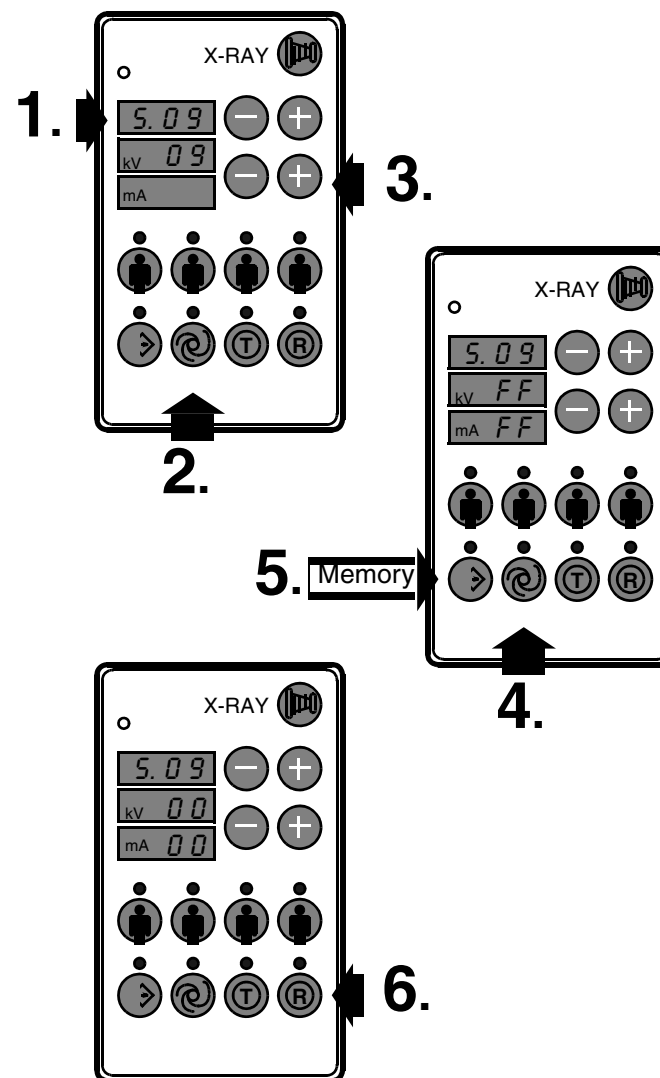
- The service routine **S.09** is used to erase all data programmed in the EEPROM on board **DX1**.

1. Select Service routine **S.09** as described in section 'Selecting service routines'.
2. Briefly press the service key .  
The kV display indicates **00**.
3. Enter the service code **09**.  
The kV display indicates **09**.
4. Briefly press the service key .  
**FF FF** appears on the kV/mA display.  
The LED above the memory key flashes.
5. Press the memory key.  
The LED above the key **R** flashes.
6. Press the Return key **R**.  
With Service routine **S.09** all programmed data contained in the EEPROM are erased. **00 00** is shown on the kV/mA display.  
The LED above the service key  lights up.

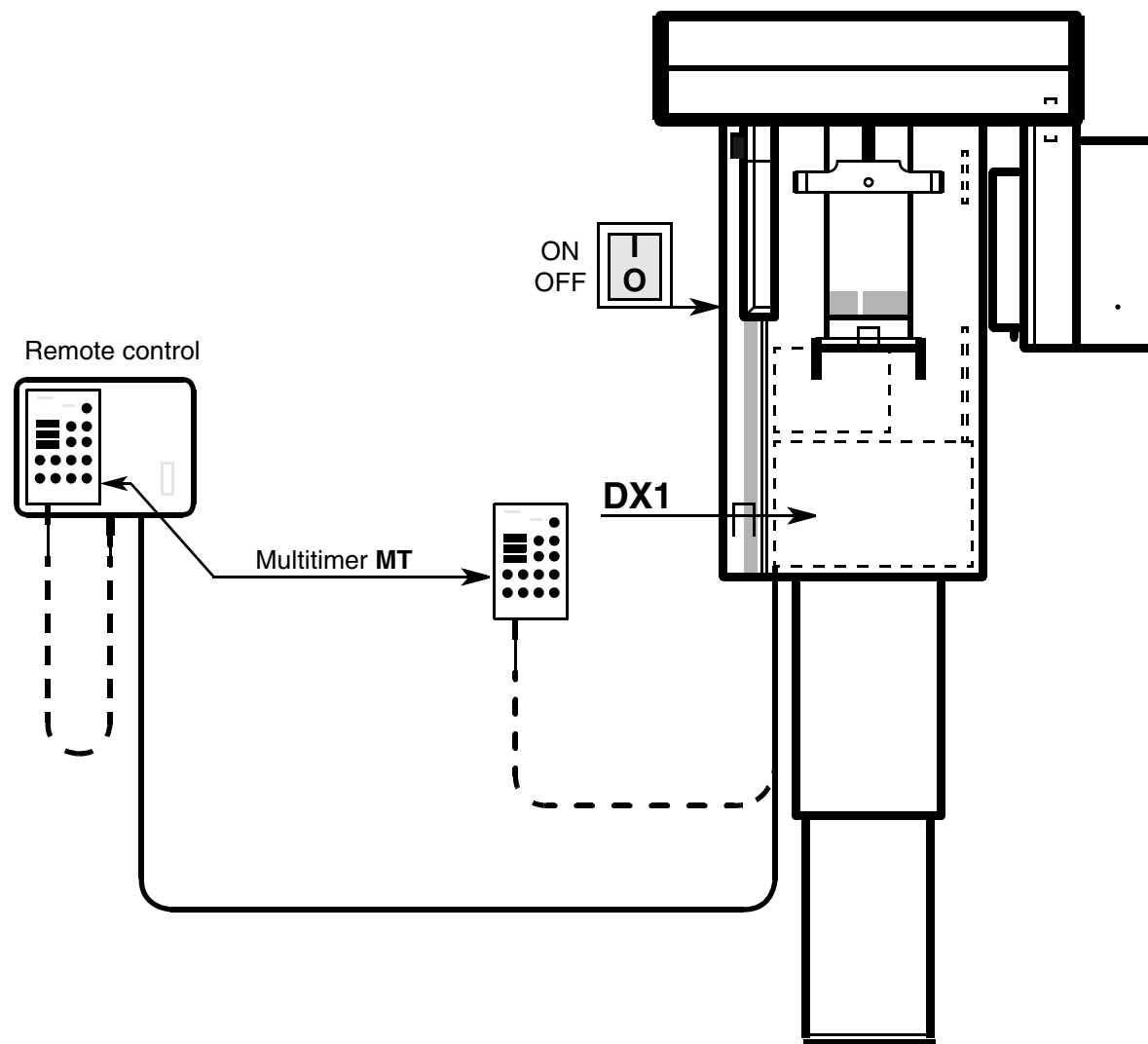
- Then briefly press the service key . This completes the test.

**NOTE:**

With Service routine **S.09** all preset values in the EEPROM will be lost →  
**Readjust DX1.**




## 5.10 Service routine S.09 Erasing EEPROM DX1



To exit the service routines switch the unit OFF and ON again.

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D 3297.077.01.10.02 04.2007

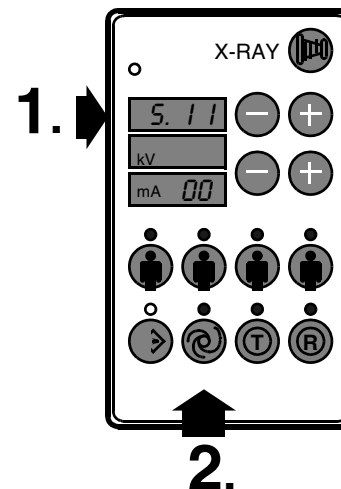
- Service routine S.11 is used to adjust the kV increase in the spinal region for Panorama radiographs.

- Select Service routine **S.11** as described in section 'Selecting service routines'.
- Briefly press the service key .  
The memory LED flashes.  
The preset correction value for the kV increase appears on the kV or the mA display. The factory setting is **00** on the mA display.
- Set the kV increase correction value in percent steps within ranges of +3 % and -6 % using the kV +/- keys.  
The positive % value is shown on the kV display and the negative % value is shown on the mA display.


|       |     |     |     |
|-------|-----|-----|-----|
|       | +1% | +2% | +3% |
| kV 02 | 01  | 02  | 03  |
| mA    |     |     |     |

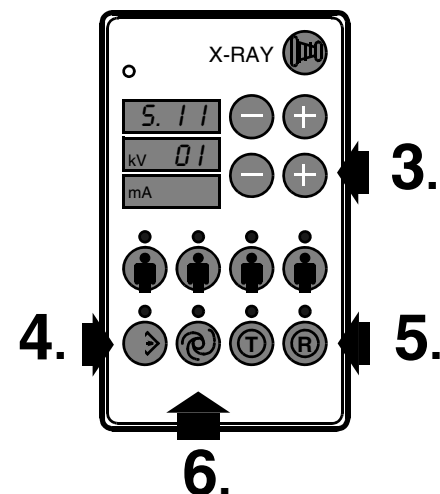
  

|       |     |     |                   |
|-------|-----|-----|-------------------|
| kV    |     |     |                   |
| mA 02 | 01  | 02  | 03                |
|       | -1% | -2% | -3% . . . . . -6% |

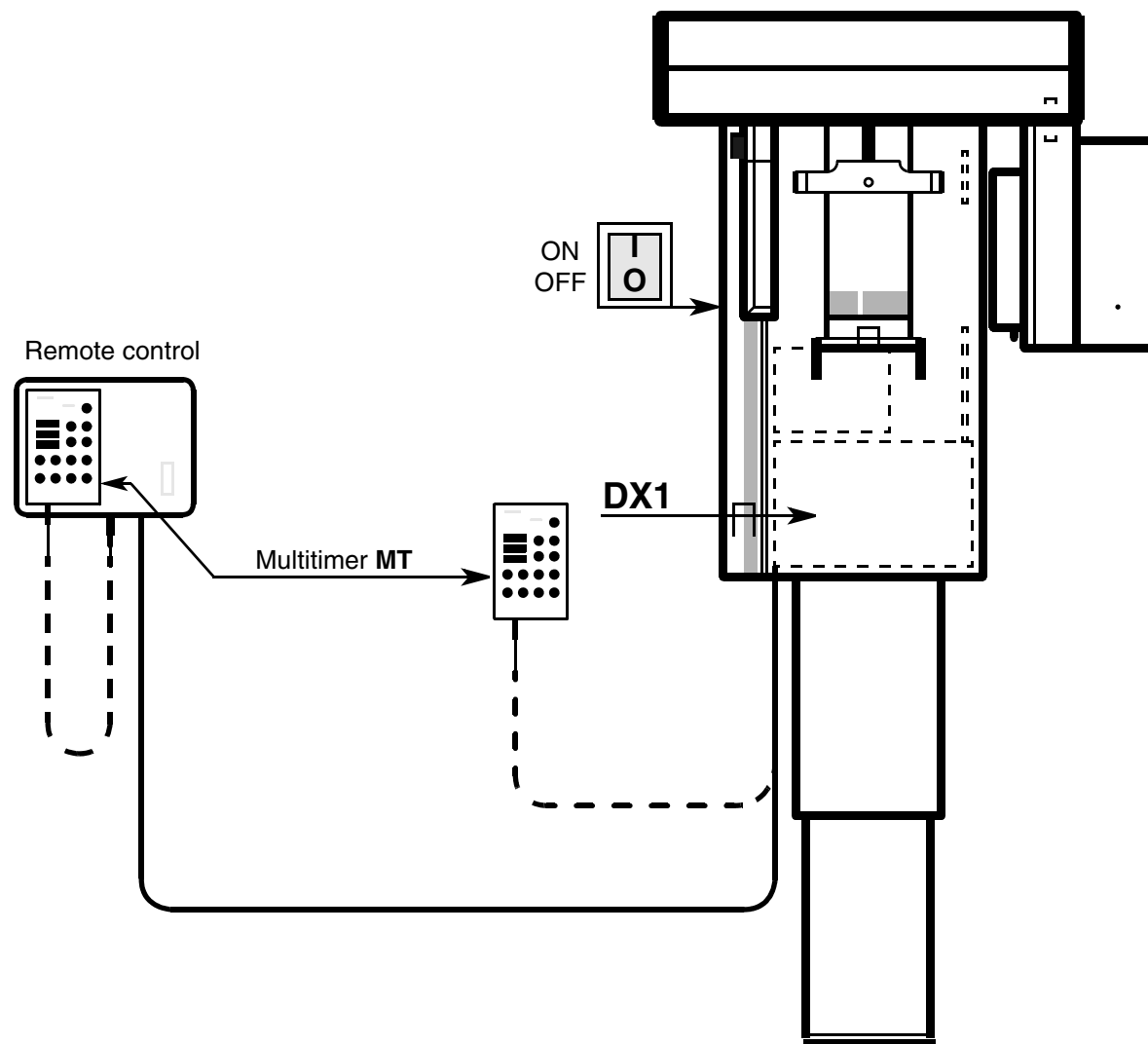


#### Programming the kV increase correction value:


- Press the memory key (LED stops flashing).  
The LED above the R key flashes.
- Press the Return key R (LED stops flashing).
- Press the service key .




## 5.11 Service routine S.11 Setting the kV increase correction value for Panorama radiographs





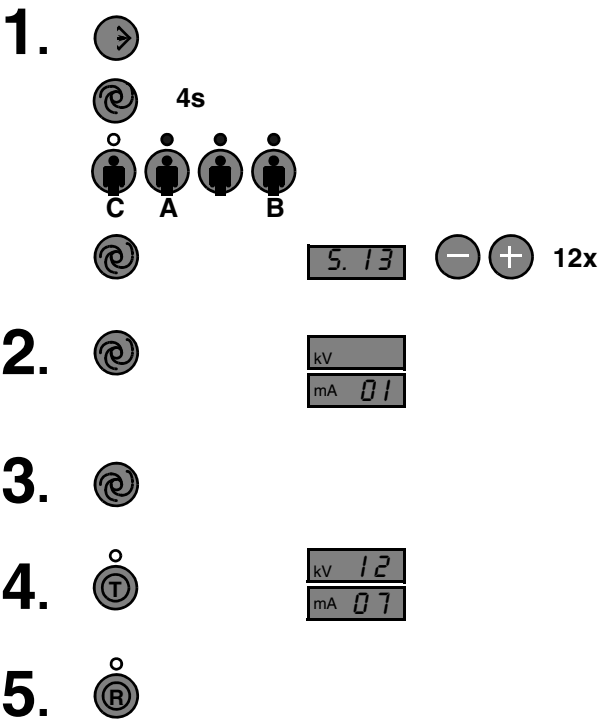
- The input signals to board DX1 can be tested with Service routine S.13.
  - Turn the unit off. **Unplug** connectors **X2, X4, X5, X6, X7, X8, X12, X13, X14, X15, X16** and **X30** from board **DX1** (if present). Connectors **X1, X9, X10** and **X11** must remain connected. Turn the unit on again.
  - Acknowledge the error message by pressing the R key on the multimeter.
1. Select Service routine **S.13** as described in section '**Selecting service routines**'.
  2. Briefly press the service key . The mA display indicates test step 01.

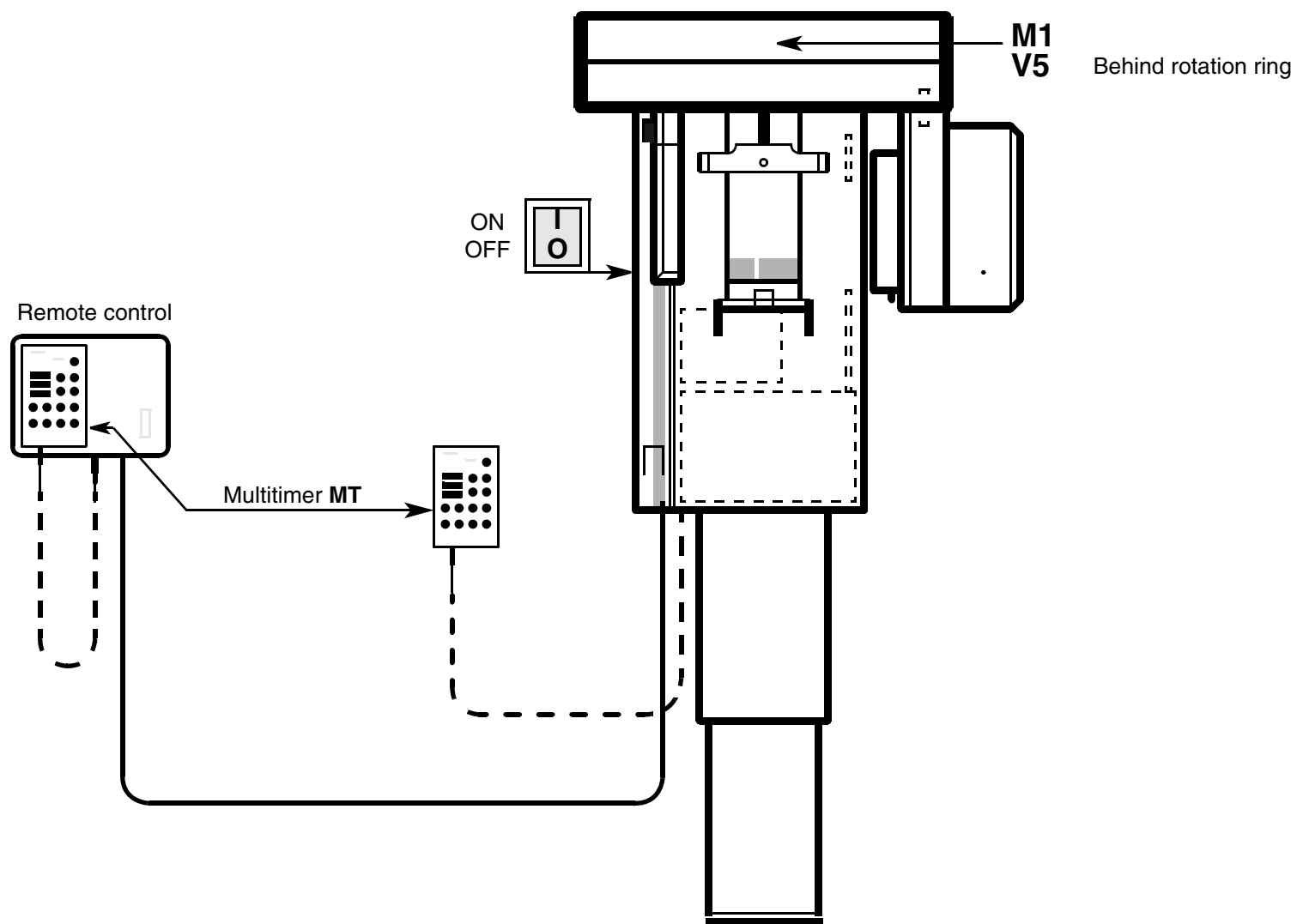
The input signals to board DX1 are checked **in test step 01**.

3. Briefly press the service key .  
The test LED lights up.
4. Press the test key.  
The R LED flashes.  
All inputs are tested for their status with all connectors unplugged. A faulty input status is indicated with its IN number and pin number. The errors can be subsequently recalled using the +/- keys of the kV/mA displays.  
kV display = IN number (input)  
mA display = pin number  
**If no error is detected, the kV/mA displays indicate 00.** For all error indications not contained in the table, please contact your customer service.


| Error indication<br>IN Pin | Signal                   |
|----------------------------|--------------------------|
| 10 30                      | Active                   |
| 12 06                      | Cassette reference point |
| 12 07                      | Cassette Pan position    |
| 12 08                      | Cassette Ceph position   |
| 12 09                      | Film inserted            |

5. Press the **R** key to terminate the error indication.
6. Turn the unit off and reconnect all connectors.







• **Certain rotation functions are checked with Service routine S.14.**



1. Select Service Routine **S.14** as described in section 'Selecting service routines'.
2. Briefly press the service key .  
The mA display indicates **01**.

The rotation functions are tested for Panorama mode **in test step 01**.

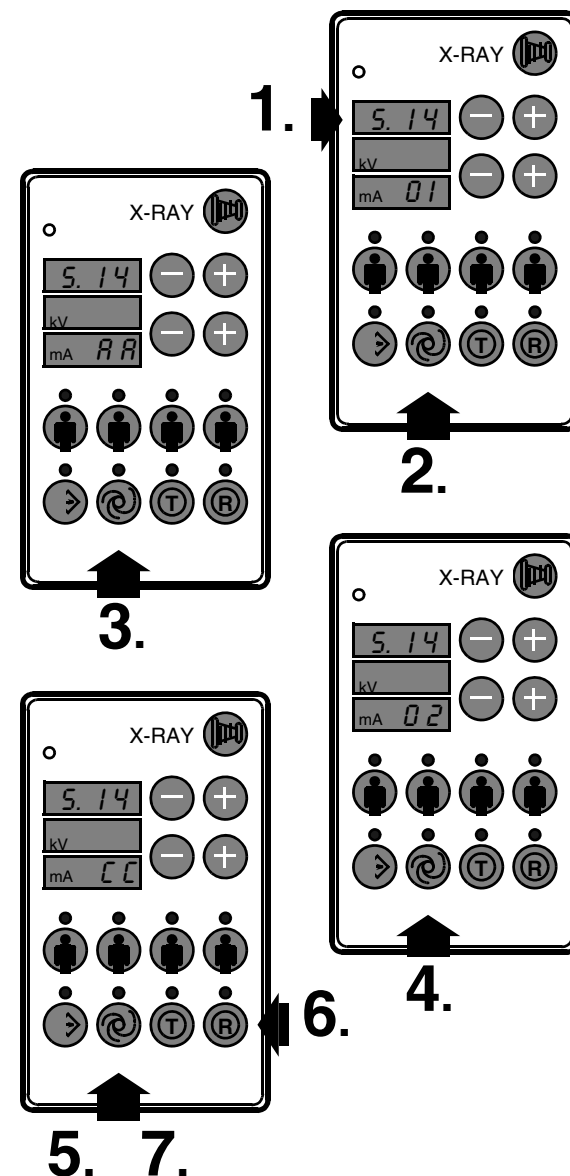
3. Briefly press the service key .  
AA is indicated on the mA display (with the X-ray tube assembly in the start position).
- If the X-ray tube assembly is not in the start position, the LED above the R key flashes. In this case press the Return key R. The X-ray tube assembly travels to the start position and the LED turns off.
- If the X-ray tube assembly does not travel to the start position, error message **E3 33** is displayed after about 16 seconds. Proceed according to section 'Correction error of message E3 33', see page 3 - 65.

4. Briefly press the service key .  
The mA display indicates test step **02**.

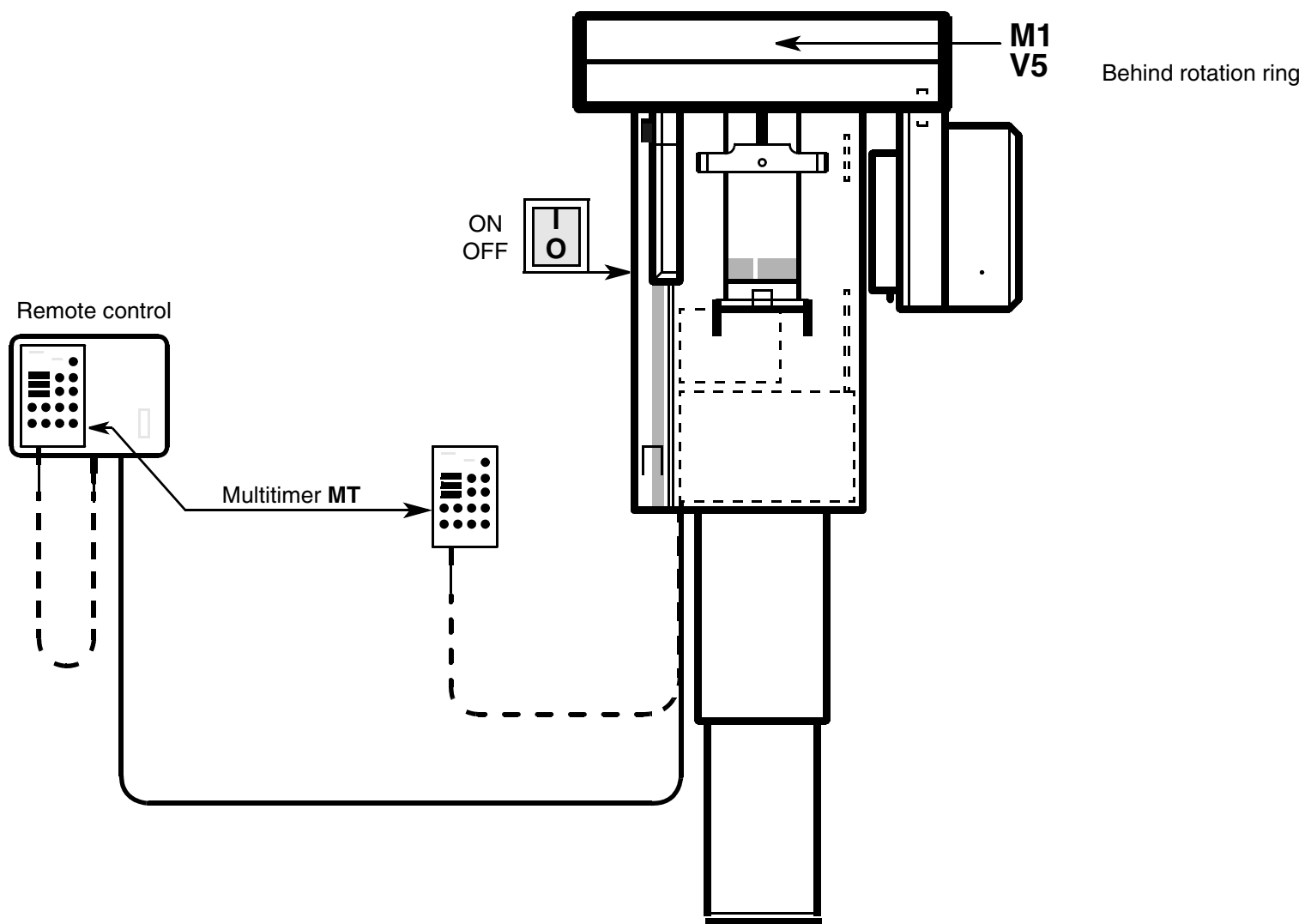
The movements for cephalometry are checked **in test step 02**.

5. Briefly press the service key .  
The mA display indicates **00**. The LED above the R key flashes.
6. Press the Return key R.  
The X-ray tube assembly travels to the exposure position for cephalometry, the LED turns off.  
**CC** is indicated on the mA display  
The rotation motor M1 keeps the X-ray tube assembly in this position.  
If the X-ray tube assembly is moved out of this position, the motor switches off and the LED above the R key flashes.  
Error message E3 42 appears if the Ceph position is not reached.
7. Briefly press the service key .  
The mA display indicates test step **03**.

continued on next page





## 5.13 Service routine S.14 Rotation functions




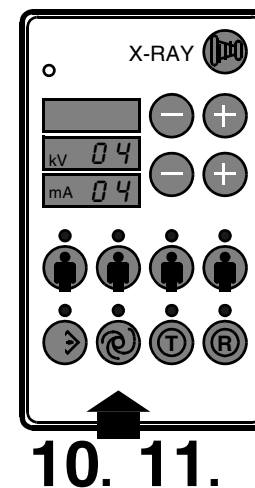
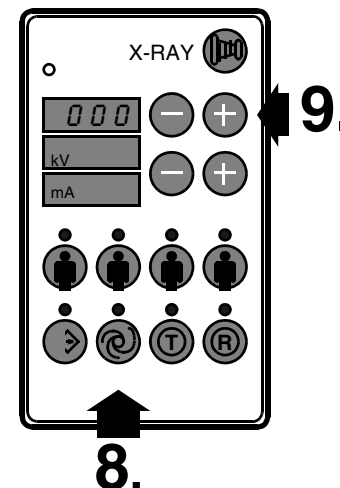
## Continued

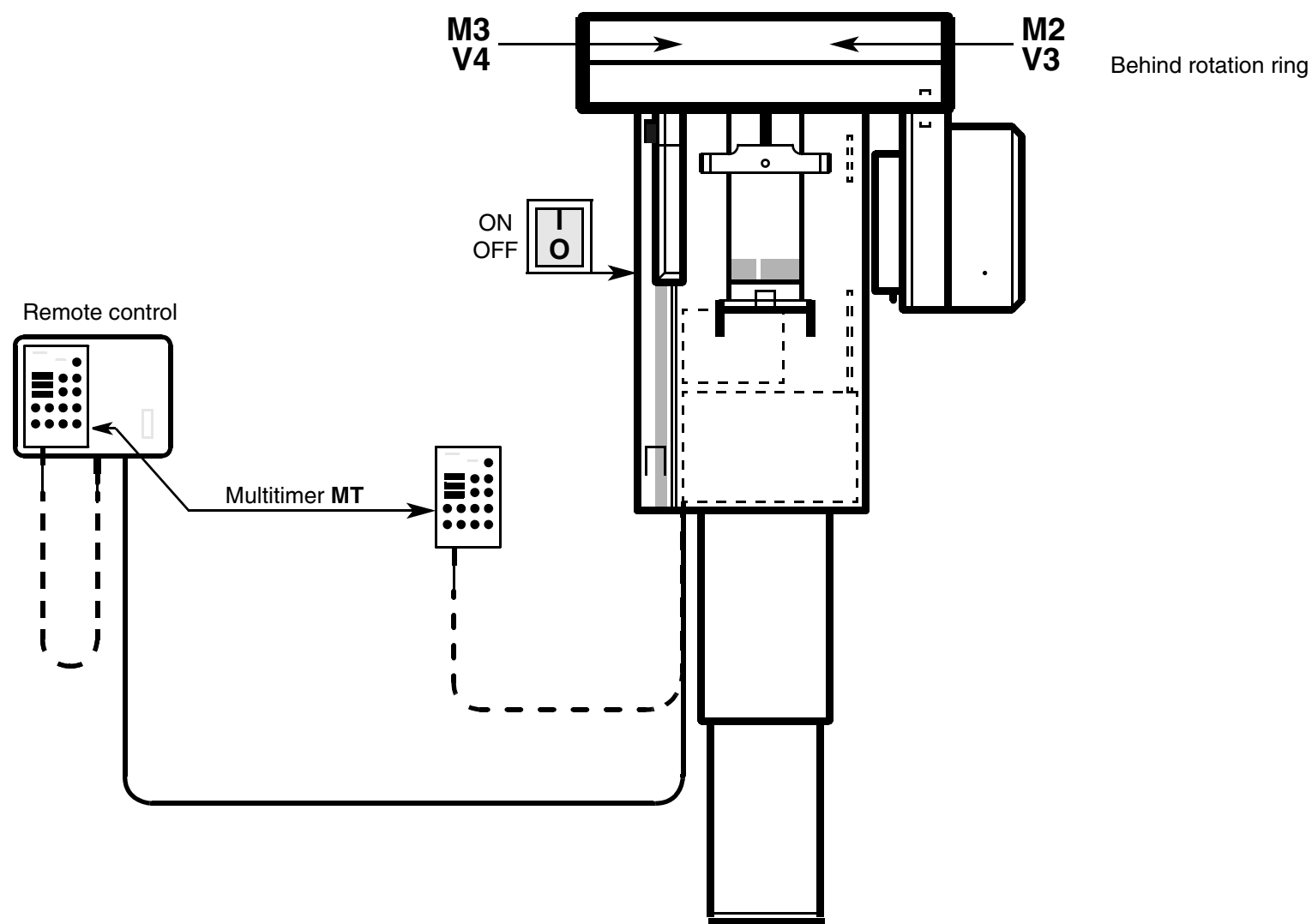
Free movement of the X-ray tube assembly / rotation ring is possible **in test step 03**.

8. Briefly press the service key .
  - If the X-ray tube assembly is not in the start position, the LED above the R key flashes. In this case press Return key R. The X-ray tube assembly now travels to the start position and the LED turns off. The LEDs above the two left-hand symbol keys must light up.
9. Start the rotation with the program + key.
  - 1° angular steps are possible. The steps from 0° to 225° are displayed on the program / radiation time display.
  - For the return press the - key.
10. Briefly press the service key .
  - Test step 04 appears on the mA display

The forked light barriers V5/V7 in the rotation ring are checked **in test step 04**.

11. Briefly test the service key .
  - By hand move the X-ray tube assembly to the start position for Panorama radiographs (V5).
  - **The LEDs above the two left-hand patient symbol keys must light up.**
  - By hand move the X-ray tube assembly to the exposure position for cephalometry (V7).
  - **The LEDs above the two right-hand patient symbol keys must light up.**










- The actuators (M2 and M3) are checked with Service routine S.15.
- **Warning:** If the unit is not in symmetry position, the light barriers and M2/M3 may be damaged.

1. Select Service routine **S.15** as described in section '**Selecting service routines**'.

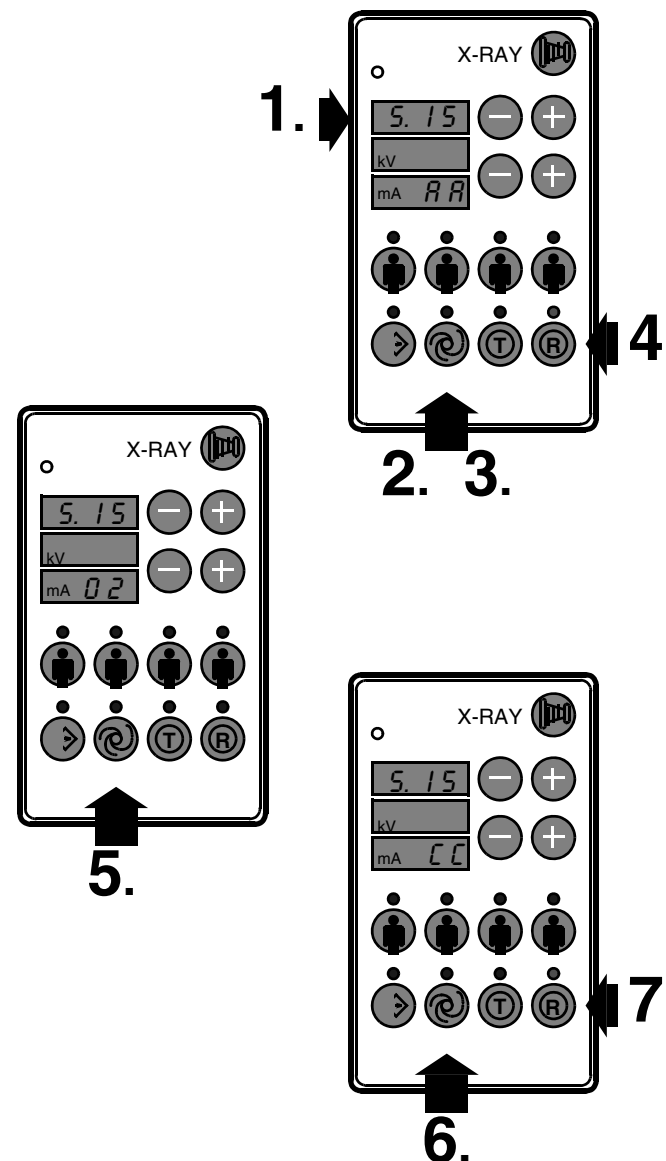
**Test step 01:** Panorama mode (no movement of the rotation ring)

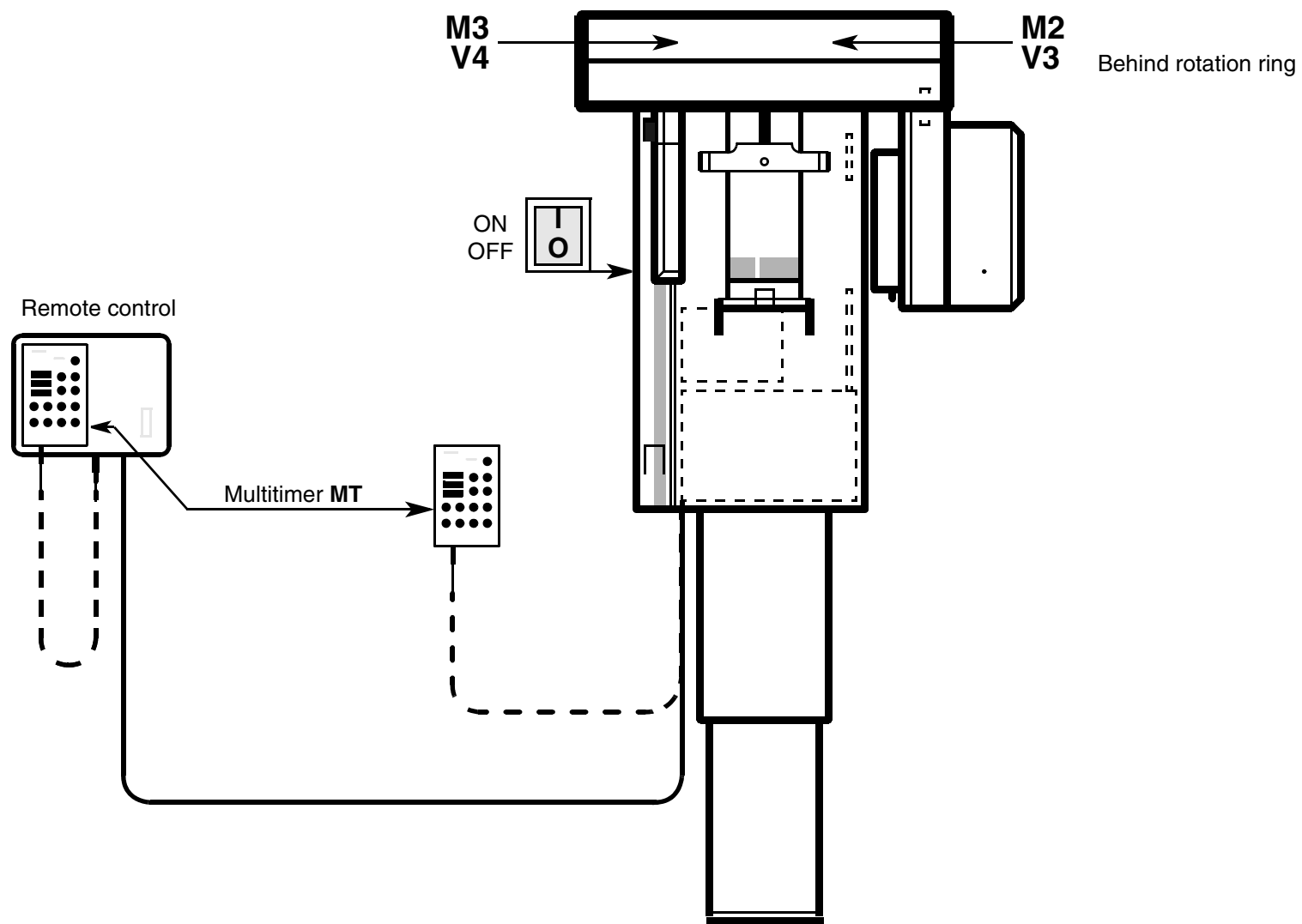
2. Briefly press the service key .  
The mA display indicates test step **01**.
  3. Briefly press the service key .  
**00** appears on the mA display. The LED above the R key flashes.
  4. Press the Return key R on the multimer.  
The actuators approach the start position (switching edge for light barriers V3 and V4 at the actuators).  
The mA display indicates **AA**. The LED above the service key  lights up.
- If the actuators do not travel to the start position, error message **E3 02** or **E3 04** is displayed after about 12 seconds. Proceed then according to section '**Correcting error of message E3 02 or E3 04**', see page 3 - 49 or see page 3 - 51.

**Test step 02:** Cephalometry mode (no movement of the rotation ring)

5. Briefly press the service key .  
The mA display indicates **02**.
  6. Briefly press the service key .  
**00** is indicated on the mA display. The LED above the R key flashes.
  7. Press the Return key R on the multimer.  
The actuators approach the **cephalometry position** (switching edge for light barriers V3 and V4). The mA display indicates **CC**. The LED above the service key lights up.
- If the actuators do not approach this position, error message **E3 02** or **E3 04** is displayed after about 12 seconds.  
Proceed then according to section '**Correcting error of message E3 02 or E3 04**', see page 3 - 49 or see page 3 - 51.

continued on next page









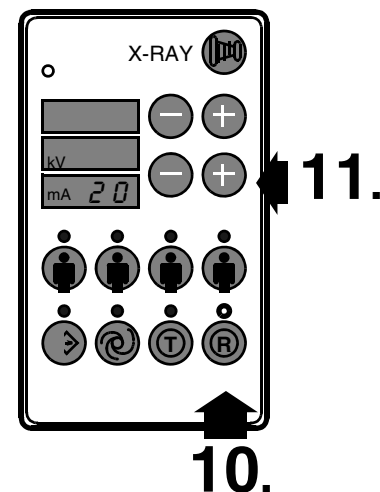
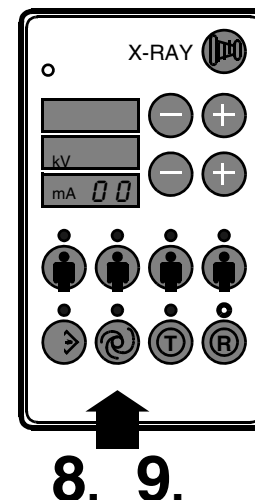
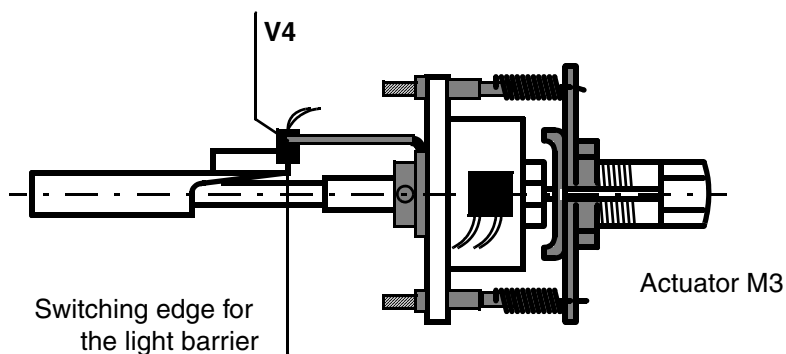
### Continued

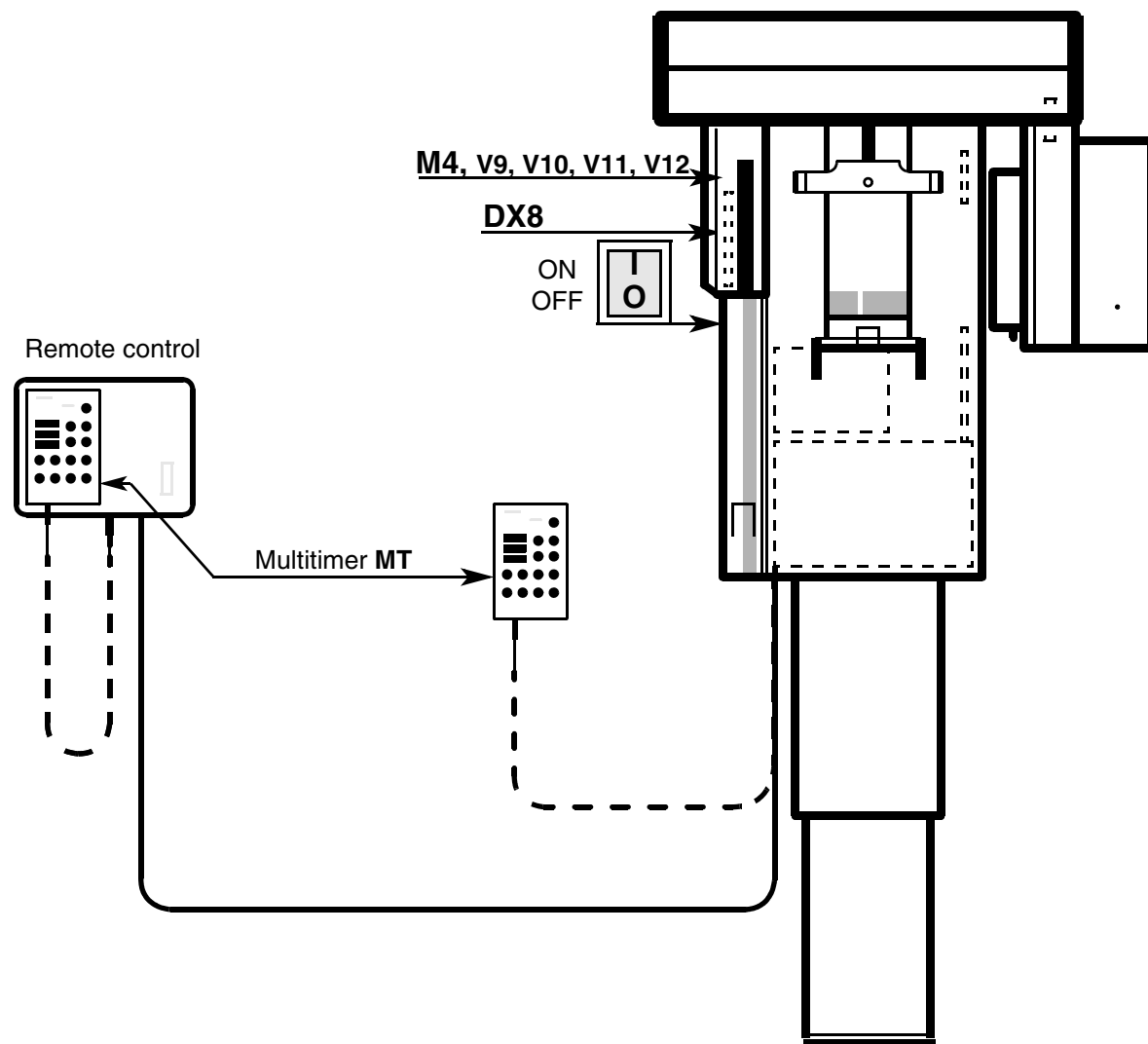
- **Warning:** If the unit is not in symmetry position, the light barriers and M2/M3 may be damaged. Perform test step 03 only if the switching edges have been detected by light barriers V3 and V4.

**Test step 03:** Free movement of actuator M2 (no movement of the rotation ring)

8. Briefly press the service key .  
The mA display indicated **03**.
9. Briefly press the service key .  
**00** is indicated on the mA display, the LED above the R key flashes.
10. Press the Return key **R** on the multimeter. The actuator moves to the **trigger position**.  
(Trigger position = switching edge of light barrier V3).  
The LED turns off. The mA display indicates **20**.
11. The actuator can be adjusted to a value from 0 - 60 (1 digit = 1 mm) with the kV +/- keys.
  - From values **0** to **19** (+1) the 4 LEDs above the patient symbol keys **do not light up**.
  - From values **20** to **60** the 4 LEDs above the patient symbol keys **light up**.
  - The change "LEDs on/off" takes place at the switching edge for **light barrier V3** at the actuator.

**Test step 04:** Free movement of actuator M3 (no movement of the rotation ring).







### ORTHOPHOS 5/Plus only



- The Service routine S.16 is used for checking the film holder.

- Select Service routine S.16 as described in section 'Selecting service routines'.

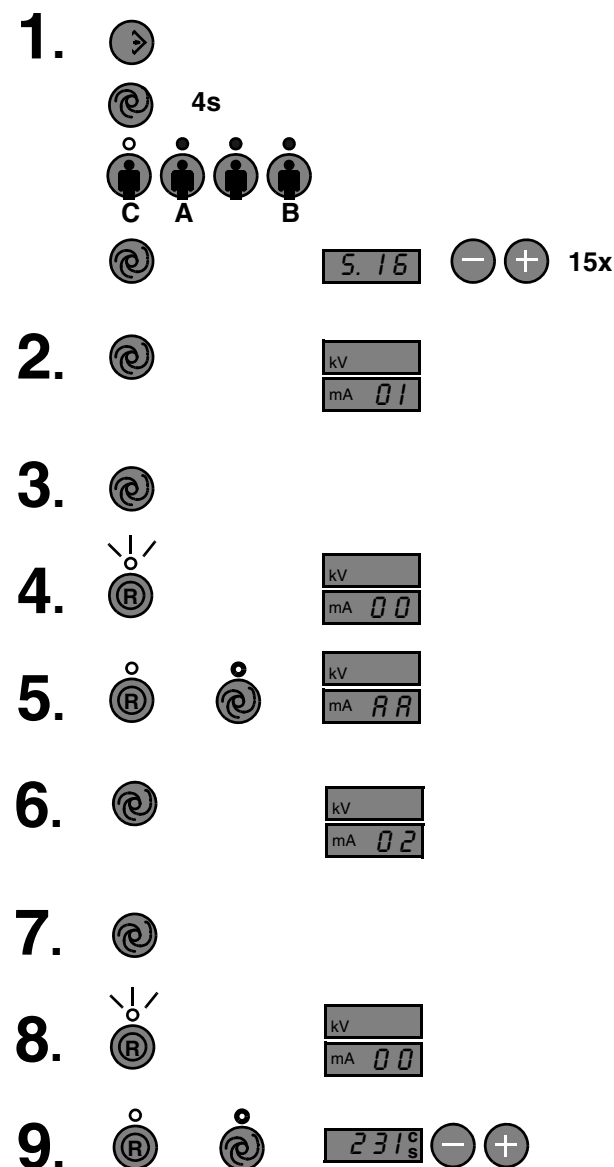
#### Test step 01: Approaching the film reference point

- Briefly press the service key .  
The mA display indicates test step 01.
  - Briefly press the service key .
  - Move the cassette holder to the Ceph or Panorama position.  
00 is indicated on the mA display. The LED above the R key flashes.
  - Press the Return key R on the multimer.  
The film moves to the reference position.  
AA is indicated on the mA display. The LED above the service key lights up.
- If the film does not travel to the reference position within a certain time, error message E3 06 is displayed. Proceed then according to section 'Correcting error of message E3 06', see page 3 - 53.

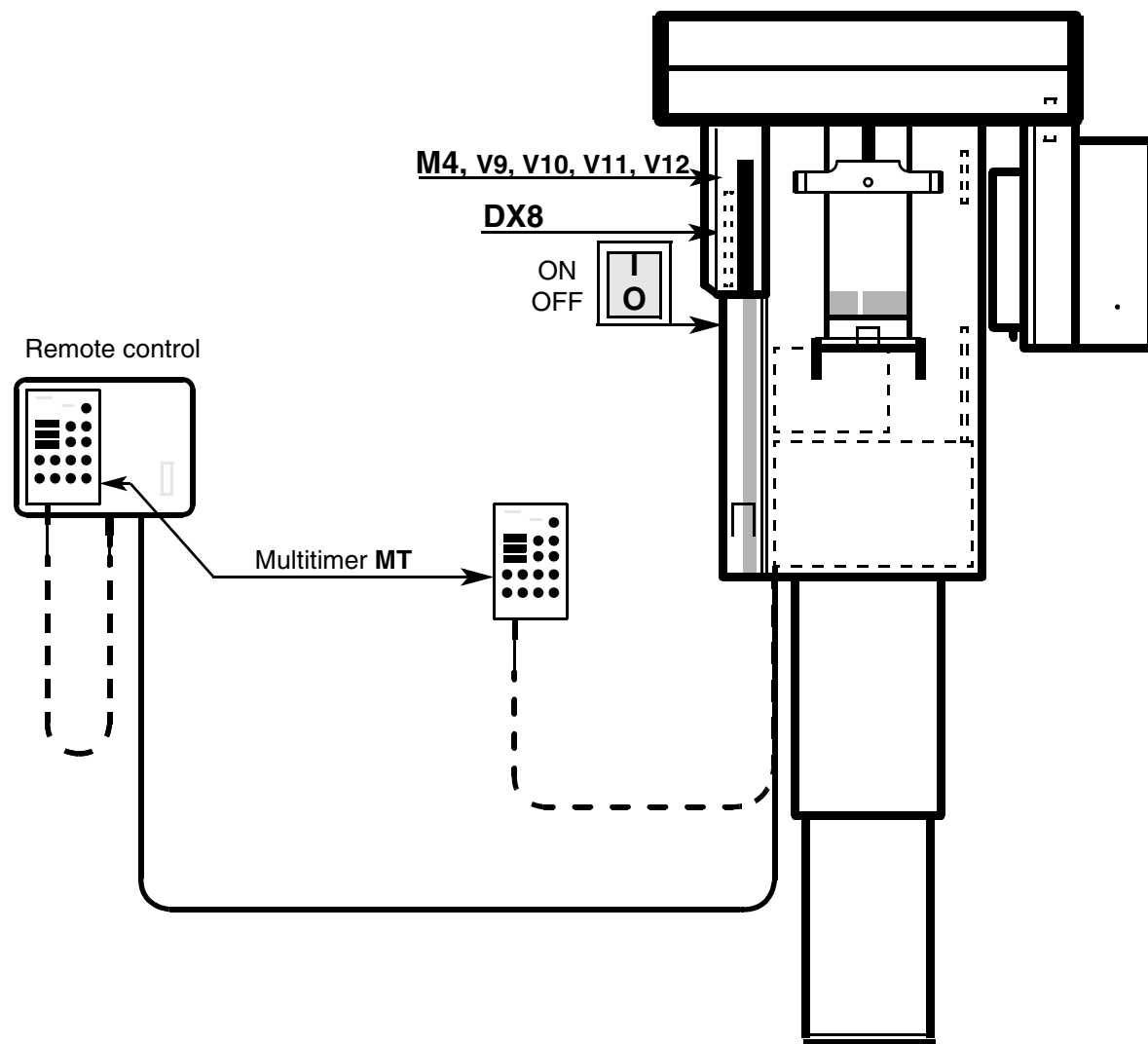
#### Test step 02: Free movement

- Briefly press the service key .
  - Briefly press the service key .
  - Move the cassette holder to the Ceph or panorama position.  
00 is indicated on the mA display. The LED above the R key flashes.
  - Press the Return key R on the multimeter.  
The film travels to the reference position. 000 is indicated on the program / radiation time display. The 4 LEDs above the patient symbol keys light up.
- The film can be moved in the range from 000 to 231 by the program / radiation time +/- keys.  
Upon leaving the reference position, the 4 LEDs above the patient symbols turn off.

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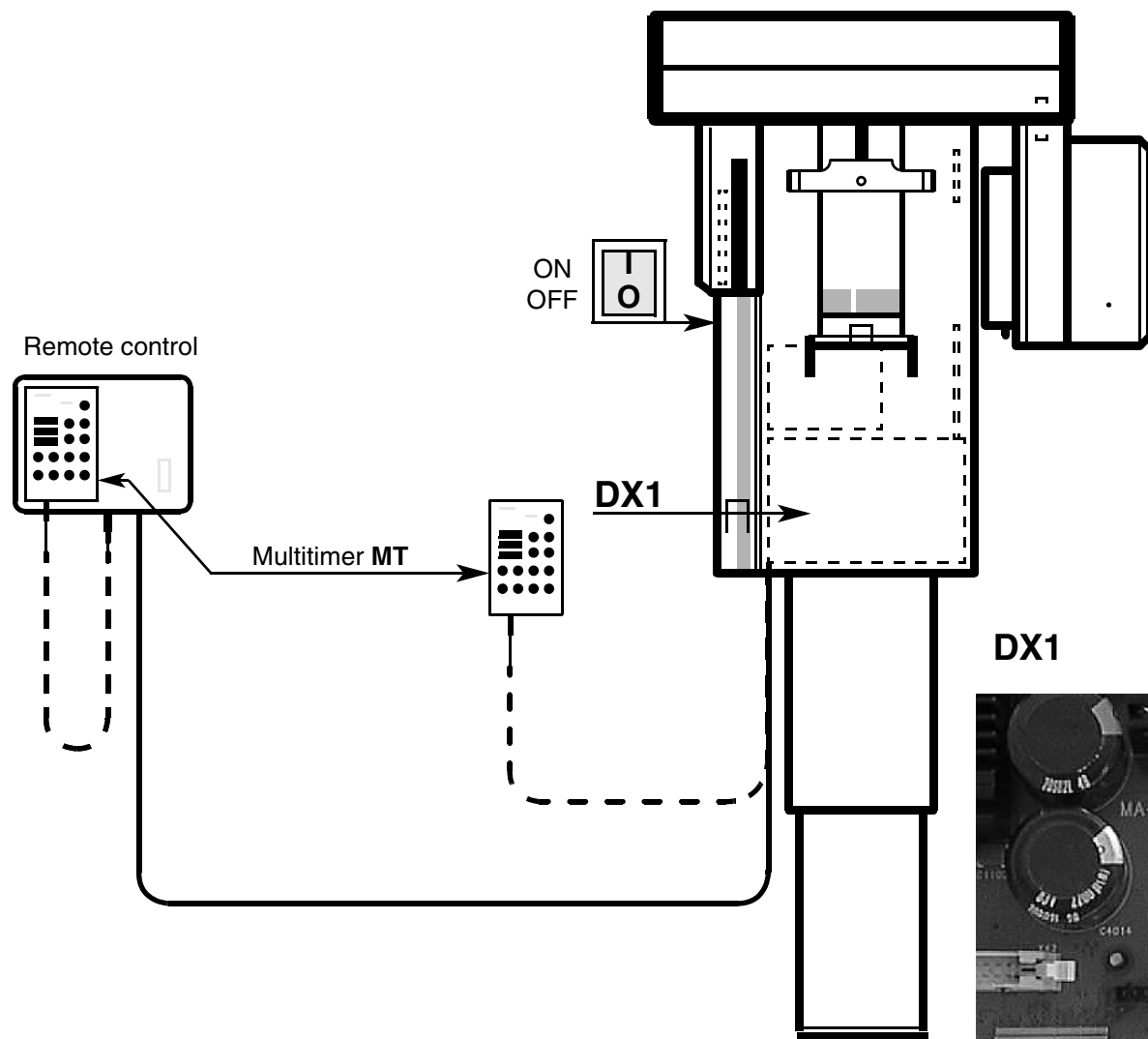
## 5.15 Service routine S.16 Film holder service



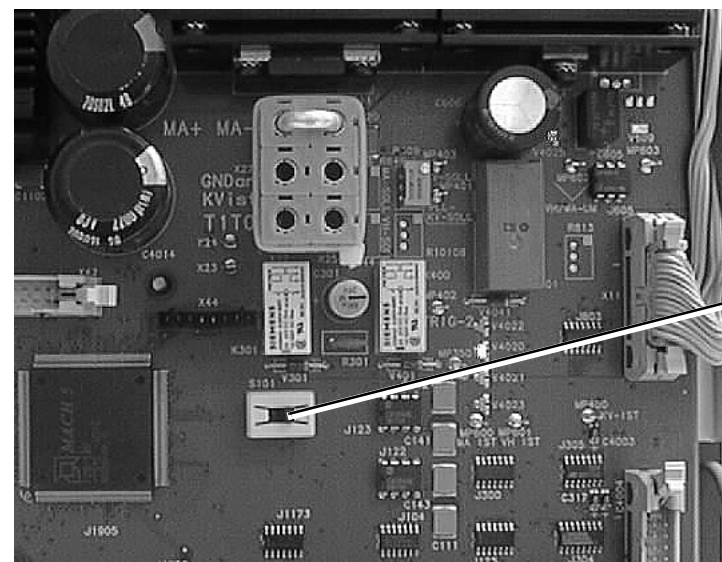
## Continued

### Test step 03: Light barrier test



10. Briefly press the service key .  
The mA display indicates test step 03.
11. Briefly press the service key .
  - The LEDs above the patient symbols show the switching state of the light barriers. All LEDs are turned off if no light barrier is activated.
  - LED 1 lights up: Light barrier V9 'reference point of film' is activated.  
The condition for the correct indication of the light barrier signal by LED 1 is:  
Light barrier V11 'Panorama position' must be activated - LED 3 lights up  
or light barrier V12 'Ceph position' must be activated - LED 4 lights up.
  - LED 2 lights up: Light barrier V10 'film inserted' is activated.  
The condition for the correct indication of the light barrier signal by LED 2 is:  
Light barrier V11 'Panorama position' must be activated - LED 3 lights up  
or light barrier V9 'reference point of film' must be activated - LED 1 lights up.
  - LED 3 lights up: Light barrier V11 'Panorama position' is activated.
  - LED 4 lights up: Light barrier V12 'Ceph position' is activated.





DX1

S101  
Right-hand  
position

• **Service routine S.17 is required for the modification of unit versions.**

1. Select Service routine **S.17** as described in section '**Selecting service routines**'.
2. Briefly press the service key .  
The kV display indicates **00**.
3. Enter service code **17**.  
The kV display indicates **17**.
4. Briefly press the service key .  
The unit identification stored in the EEPROM of the unit is indicated on the mA display.  
If the unit identification of the memory card should deviate from that on the EEPROM but is compatible with it, then the LED above the memory key flashes.

**Taking over the unit identification:**

5. Press the memory key (LED stops flashing).  
The LED above the R key flashes.
  6. Press the Return key R (LED stops flashing).  
The **new** unit identification now stored in the EEPROM is indicated on the mA display.
  7. Briefly press the service key . This exits the Service routine S.17.
- Transferring the unit identification is not possible, if:
    1. The unit identifications already match (LED above the memory key not flashing).
    2. An incompatibility of the unit identifications (see table) exists (LED above the memory key not flashing).
  - To exit Service routine S.17 briefly press the service key .

**Unit compatibilities:**

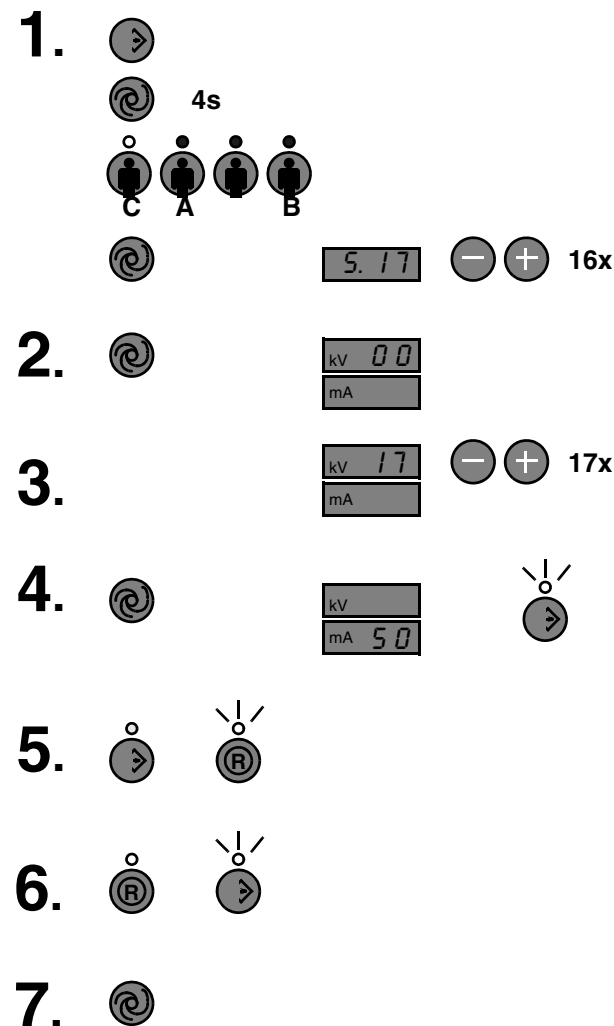
**Group A:**

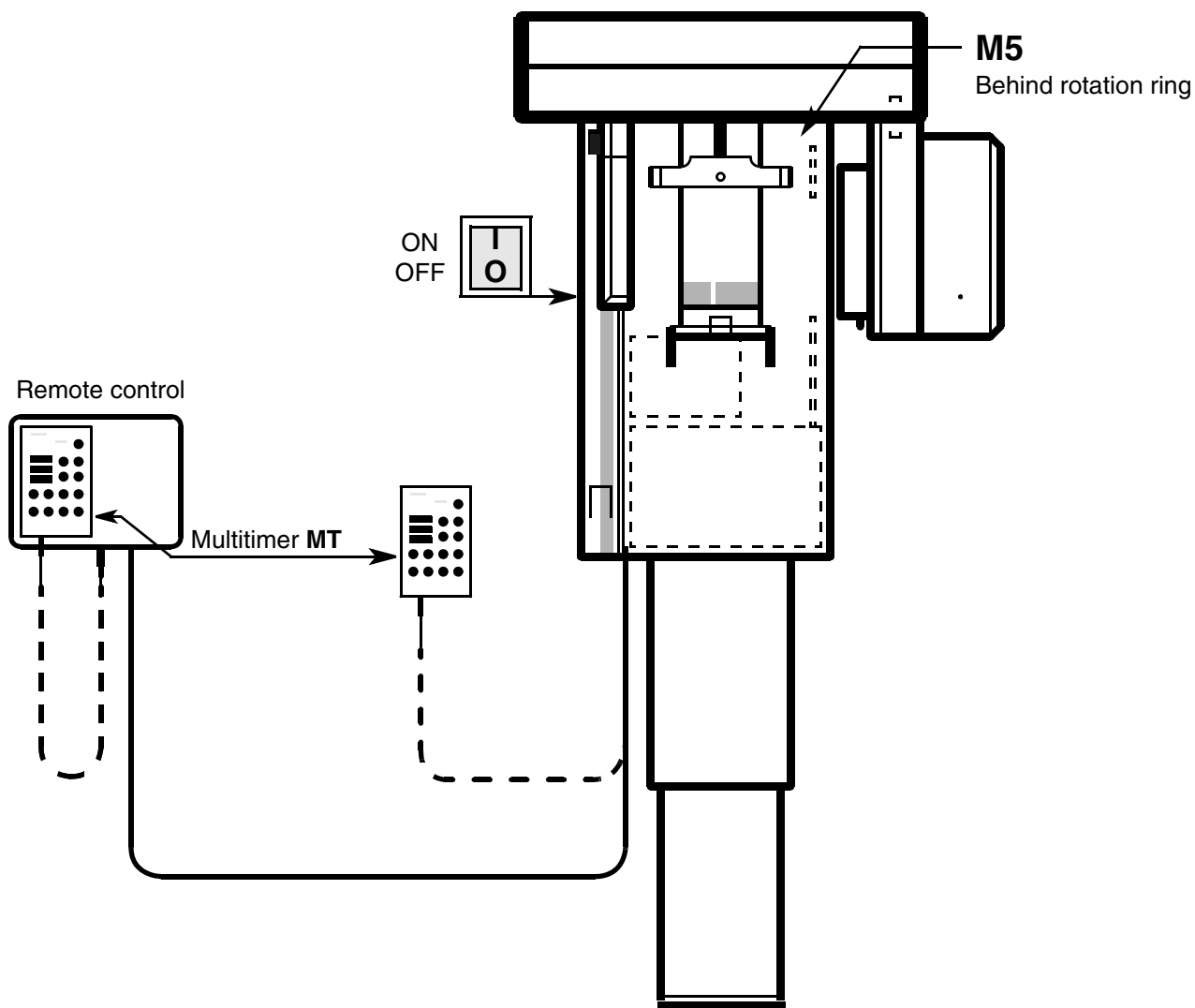
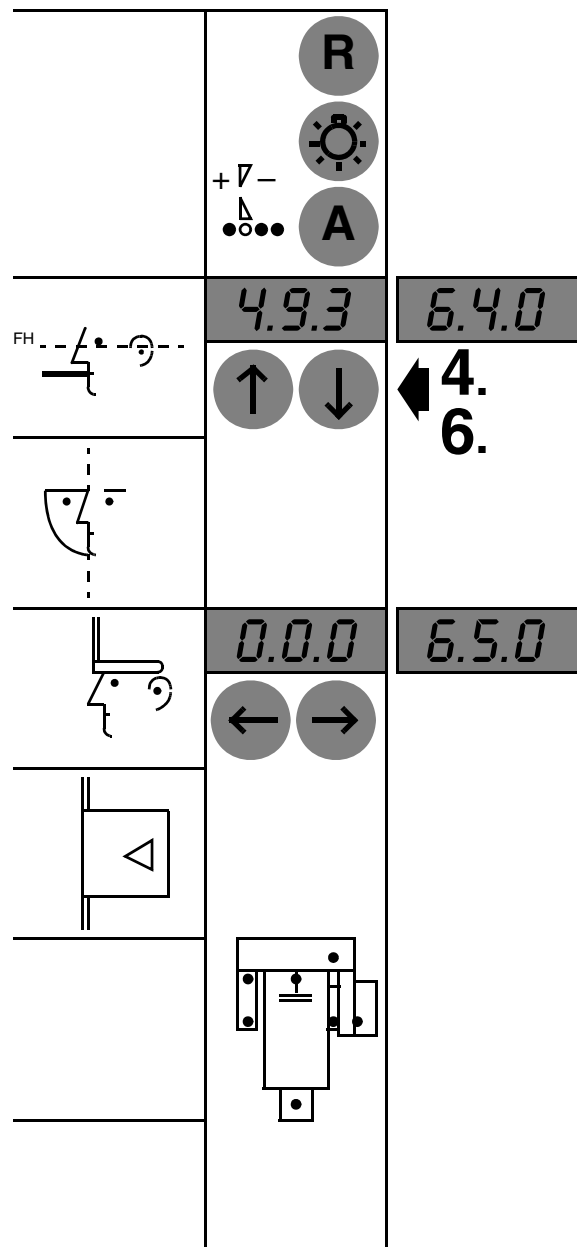
10 = ORTHOPHOS Plus DS (Ceph)  
12 = ORTHOPHOS Plus DS TSA (Ceph)  
50 = ORTHOPHOS Plus / (Ceph) Filming device  
51 = ORTHOPHOS 5 / (Ceph) Filming device  
52 = ORTHOPHOS TS / (Ceph) Filming device

**Group B:**


30 = ORTHOPHOS 3 / (Ceph) Filming device  
31 = ORTHOPHOS 3 DS

Group identifications may be reprogrammed freely within a group, but not across groups.








- **Service routine S.18 is needed for checking the height adjustment.**
  - Place the removed panels or substituting weights for the removed panels of approximately 6kg on the rotation ring.
1. Select Service routine **S.18** as described in section 'Selecting service routines'.
  2. Briefly press the service key . The mA display indicates test step **01**. Select the desired test step with kV +/- keys.

**Test step 01: Checking smoothness of movement**


3. Briefly press the service key . The kV display indicates 01.

Display on the lateral control panel:

- Current height on the height adjustment display, without decimal point → position of height adjustment below the correction switch SHV, with decimal point → position of the height adjustment above the correction switch SHV.
  - 000 on forehead support display in valid position ( - - - in invalid position)
4. Use the height adjustment keys to adjust the height through the entire adjustment range. The speed of the height adjustment motor is indicated on the frontal support display (pulses from light barrier V6); specified values are 600 - 700. If the specified speed is not reached, the decimal points on the front support display light up.

Briefly press service key . The mA display indicates test step **02**.

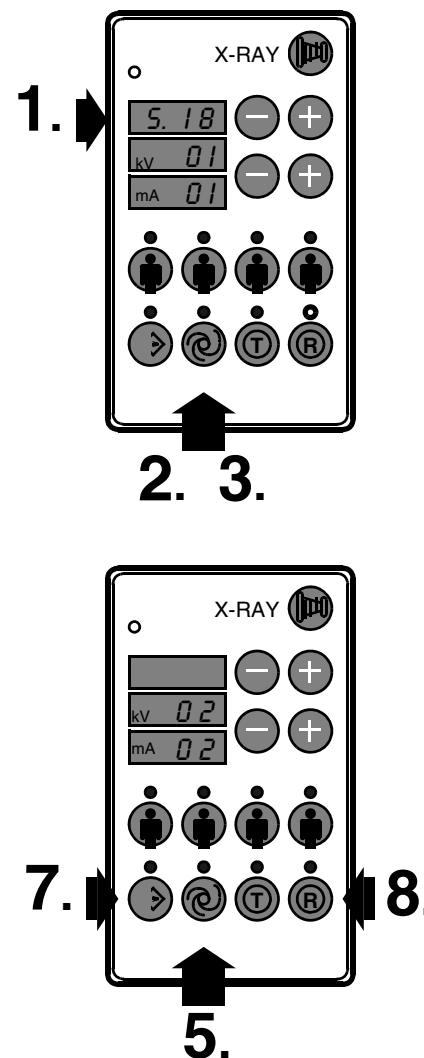
**Test step 02: Setting the upper limit for height adjustment**

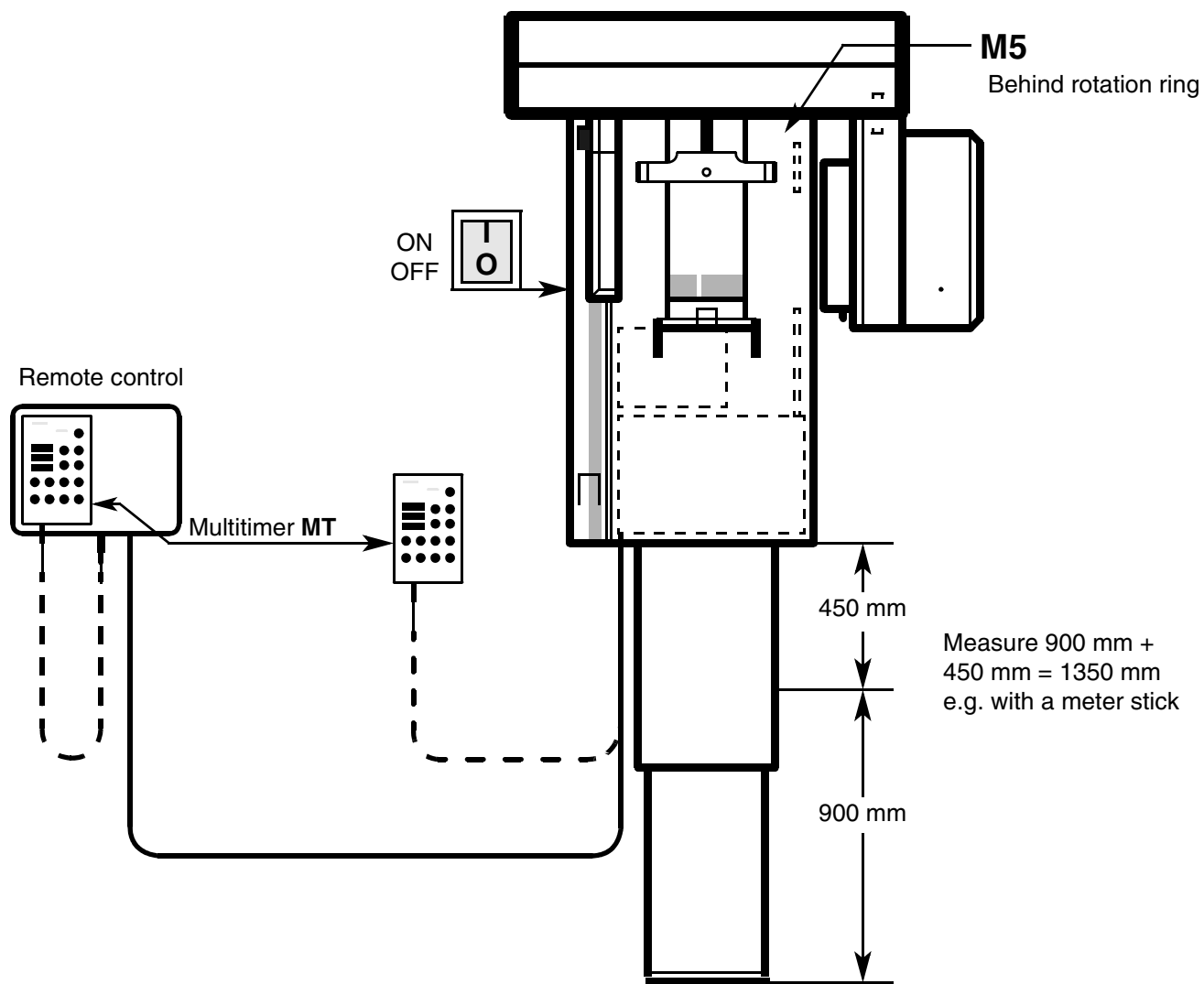
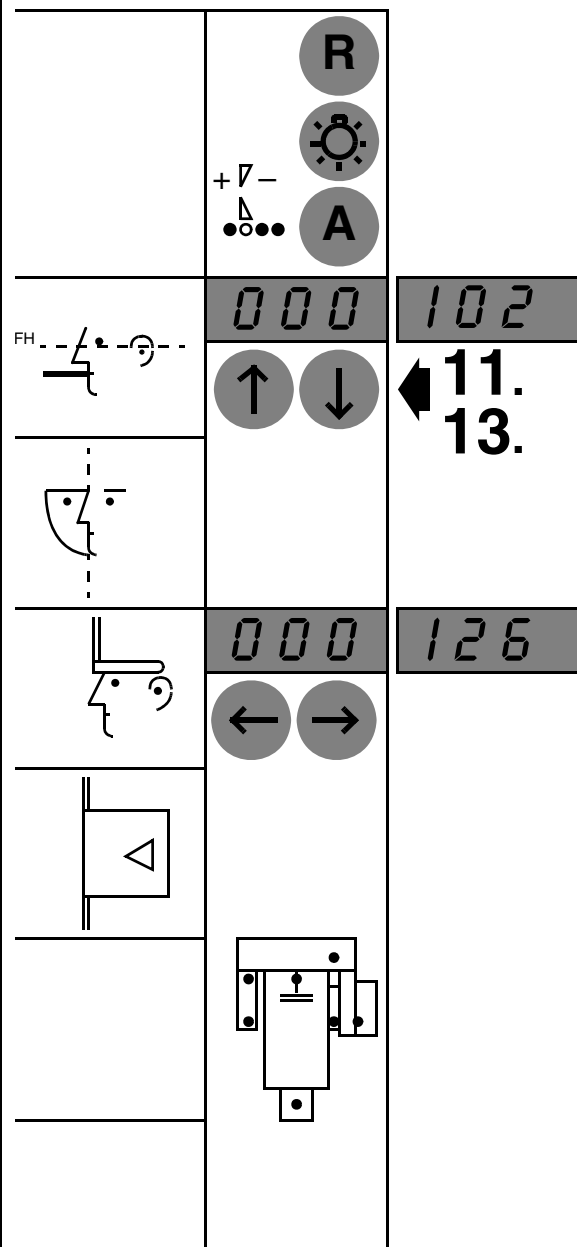
5. Briefly press the service key . The kV display indicates **02**. The current height is indicated on the height adjustment display of the lateral control panel. The memory LED on the multimer flashes.
6. Use the height adjustment keys to drive the unit to the desired maximum height (> 320). The memory LED does not light up.

**For programming:**

7. Press the memory key (LED stops flashing). The LED above the R key flashes.
8. Press the Return key R (LED stops flashing). The LED above the service key lights up. The new height is now stored.

continued on next page









### Continued

9. Briefly press the service key . The mA display indicates test step 03.


#### Test step 03: Movement with constant Pulse-Width Modulation

- Briefly press the service key . The kV display indicates 03.  
The current height is indicated on the height adjustment display on the lateral control panel.  
The program/radiation time display on the multimer shows 001.
10. Set the PWM value between 1 and 400 with the +/- keys. The movement to be expected is upward for values between 11 and 20 or downward for values between 100 and 130 (200 in the lower approach region).
  11. Move the unit with the height adjustment key.
  12. Briefly press the service key . The mA display indicates test step 04.

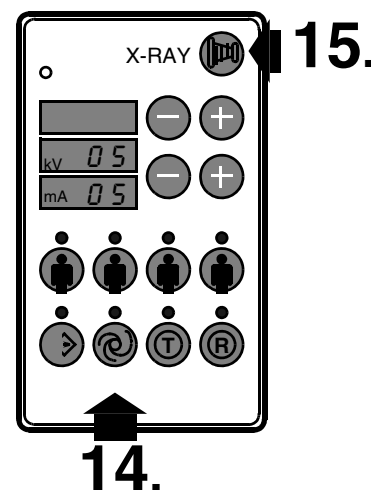
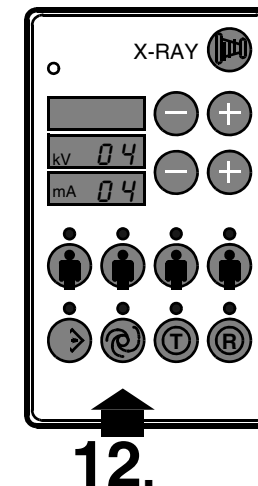
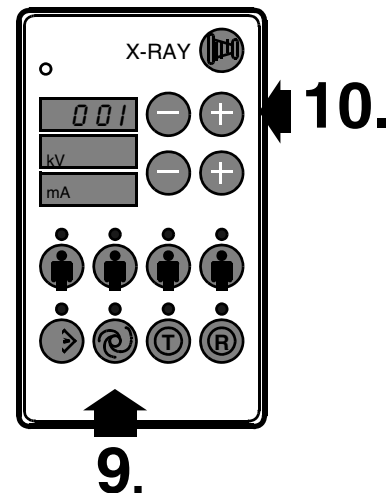
#### Test step 04: Test of light barriers V6 for HV/TDI pulses and V8 for Ceph pulses

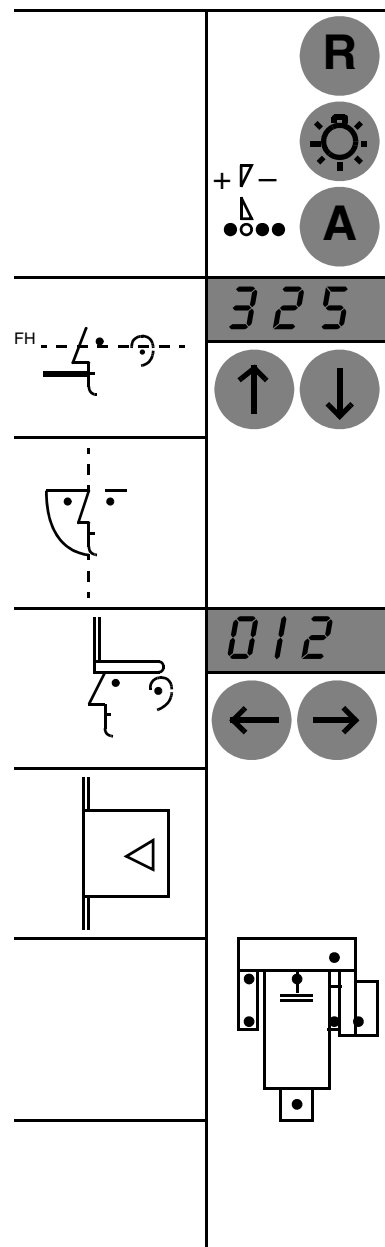
- Briefly press the service key . The kV display indicates 04.  
000 is indicated on the height adjustment and front support displays.
13. Use the height adjustment keys to adjust the height with the defined constant speed.  
The frequency of the light barrier V6 for HV/TDI pulses is indicated on the HV display.  
The frequency of light barrier V8 for Ceph pulses is indicated on the front support display.  
When the movement stops the last measured values are displayed permanently.  
The pulses must be in a fixed ratio.  $V6 / V8 = 34 / 42$  (approx.  $1/1.2$ ) = constant.
  14. Briefly press the service key . The mA display indicates test step 05.

#### Test step 05: Checking the travel

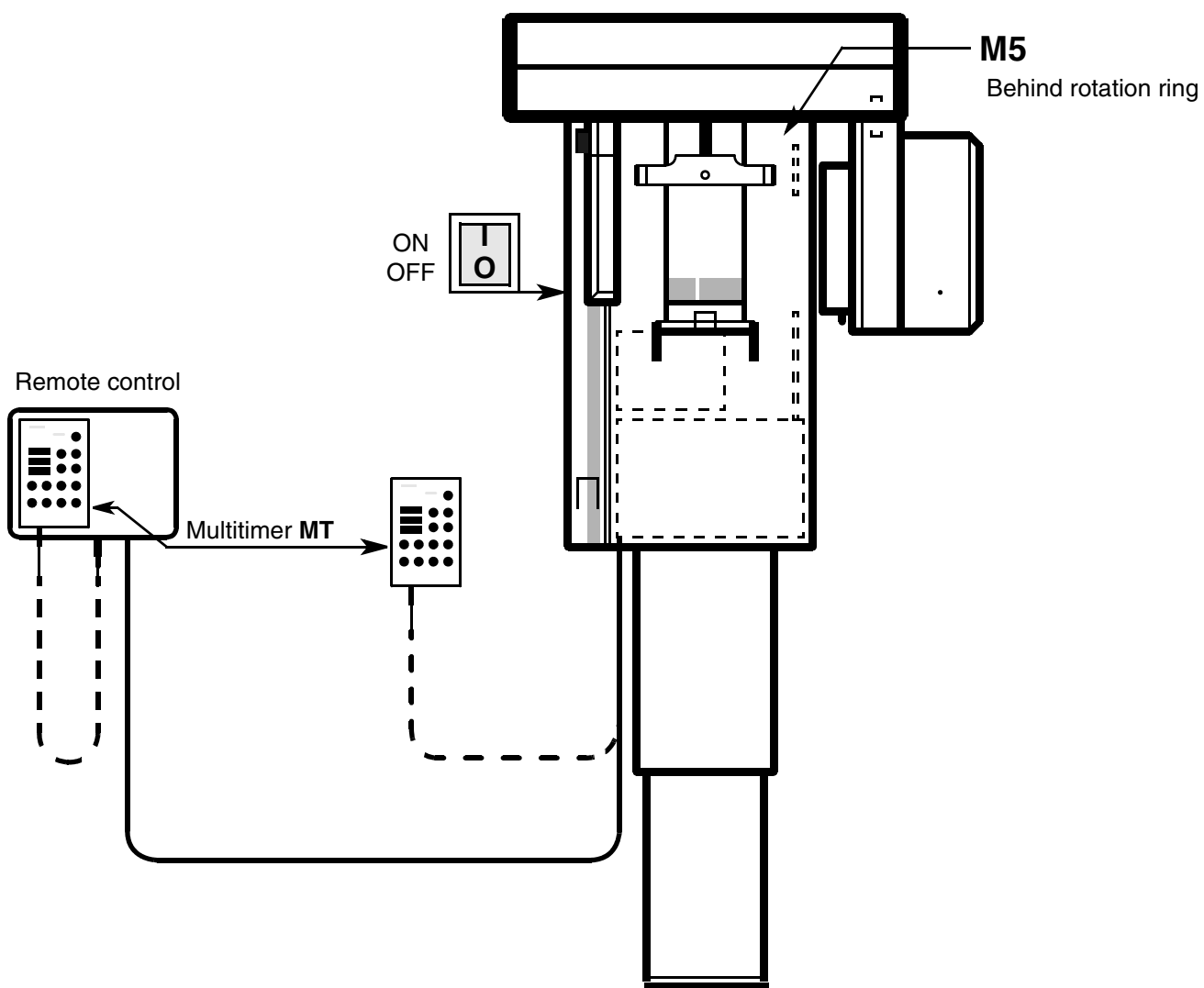
- Briefly press the service key . The kV display indicates 05.  
The current height is displayed on the height adjustment display of the lateral control panel.  
Drive the unit to a position below 162 or above 477.  
The kV/mA display on the multimer indicates 05.
15. Press the X-ray key and hold it pressed.  
The unit receives 10000 HV/TDI pulses (V6). One pulse corresponds to 45 micrometer, i.e. the unit travels 45 mm  $\pm$  1 mm.
  16. Release the X-ray key.

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19.




**Continued**

17. Briefly press the service key . The mA display indicates test step 06.

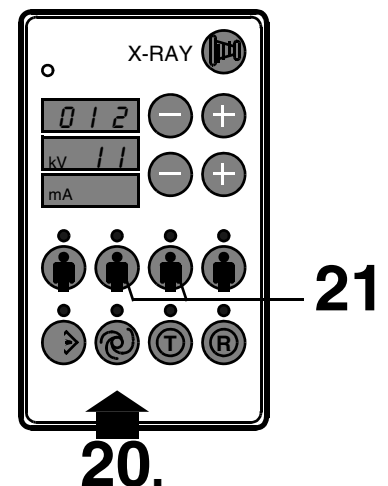
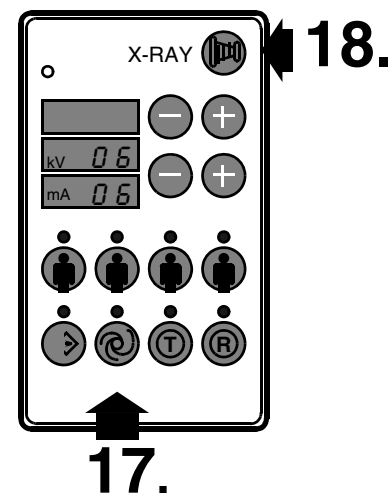
**Test step 06:** Determining the switching hysteresis of correction switch SHV

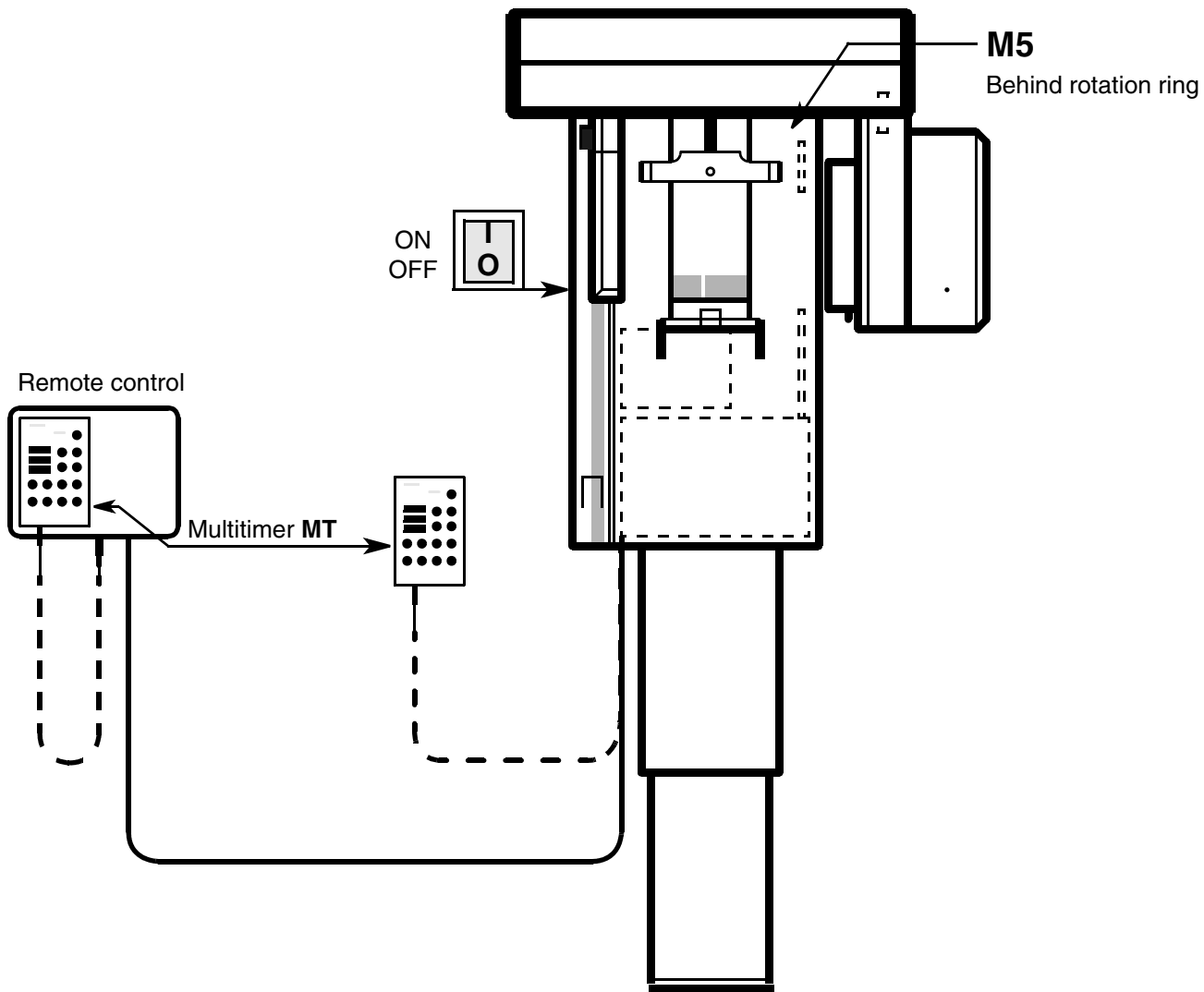
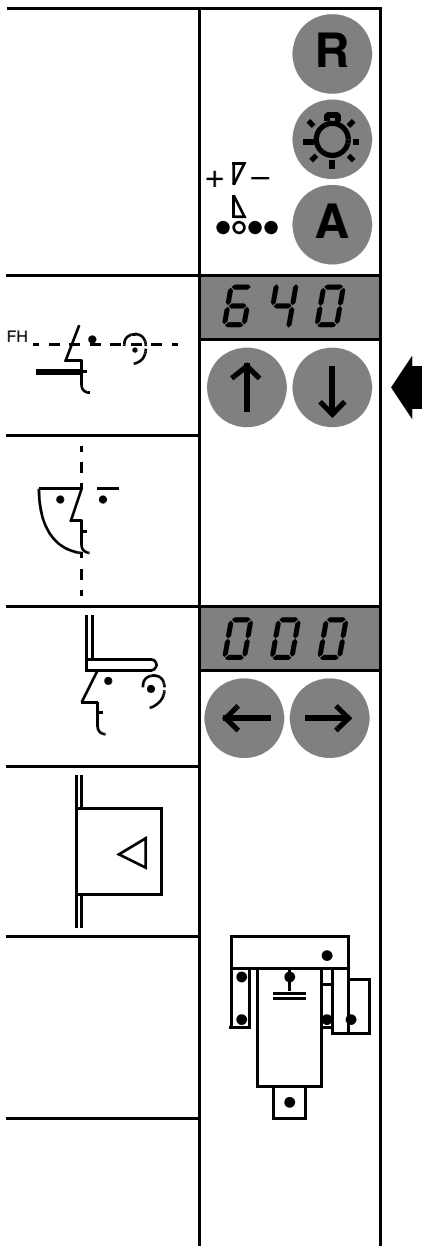
- Briefly press the service key . The kV display indicates 06.  
The current height is displayed on the height adjustment display of the lateral control panel.
18. Press the X-ray key and hold it pressed.  
The unit passes four times the switching edge.  
The average value of the hysteresis is indicated on the front support display.  
The deviation must not exceed 35.  
If the deviation is greater search for a mechanical problem; e.g. check the belt tension and adjust the correction switch.  
(This routine is intended for adapting other correction switches. Storage with memory and Return keys is not necessary under present circumstances.)
19. With the height adjustment keys slowly drive over the correction switch; no step change of digits should be seen.
20. Briefly press the service key . The mA display indicates test step 07

**Test step 07:** Adjusting the start characteristics of the height adjustment motor

- Briefly press the service key .
21. With the height adjustment keys the unit can be moved to any desired position by pressing one of the two patient symbol keys in the middle.  
With a new installation or after replacement of a gas-operated spring you must run through the entire height adjustment range at least six times.

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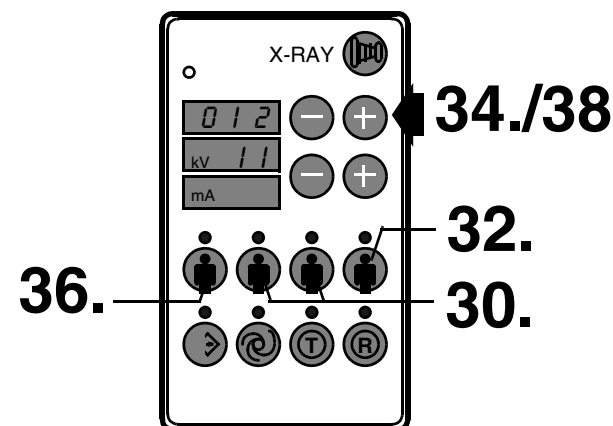
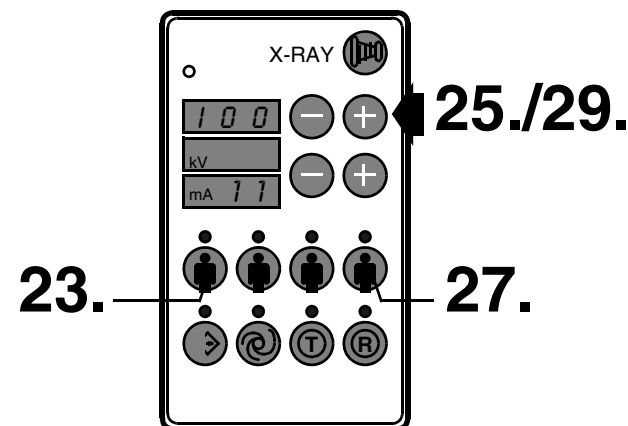


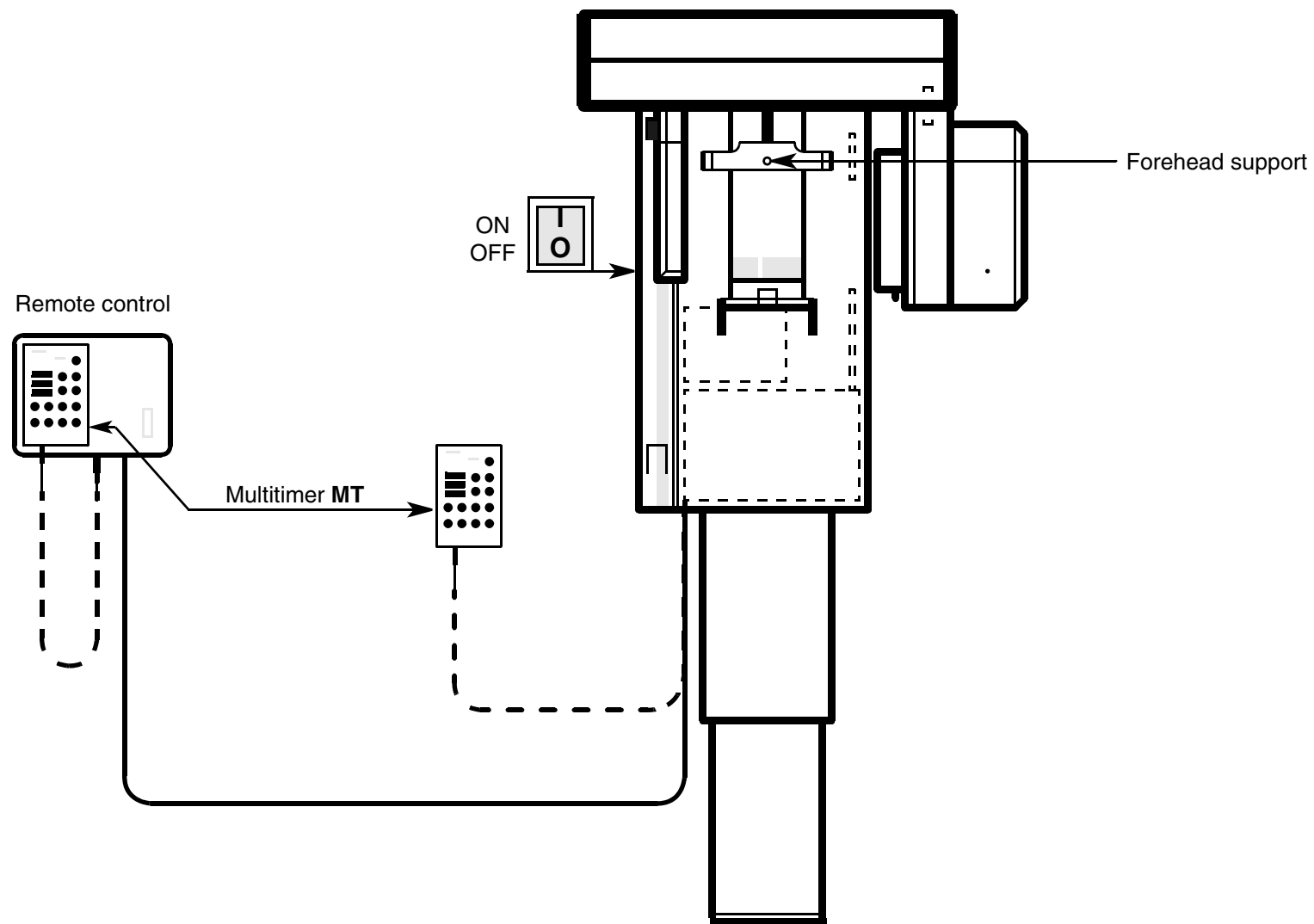
### Continued

22. Move the unit upward (height indication 640).
23. Press the small patient symbol key. The mA display indicates 11.  
The last selected PWM value appears on the program/radiation time display.
24. Move the unit downward with the height adjustment key (but not below 610).  
The unit must start smoothly and slowly.
25. Vary the start characteristics (approx. 100) with the program/radiation time +/- keys so that downward travel from the upper position is smooth and without jerks.
26. Move the unit to 610.
27. Press the large patient symbol key.
28. Drive the unit upward with the height adjustment key.
29. Change the starting characteristics (approx. 15) with the program/radiation time +/- key as required until upward travel from position 610 is smooth and without jerks.
30. Press one of the patient symbol keys in the middle.
31. Drive the unit downward (indicated height 000).
32. Press the large patient symbol key. The kV display indicates 11.  
The last adjusted PWM value appears on the program/radiation time display.
33. Drive the unit upward with the height adjustment key (but not above 040).  
The unit must start smoothly and slowly.
34. Change the starting characteristics (approx. 12; adjusting range 0-100) with the program/radiation time +/- key as required until the upward travel from the lower position is smooth and without jerks.
35. Move the unit to 040.
36. Press the small patient symbol key.
37. Drive the system downward with the height adjustment key.
38. Change the starting characteristics (approx. 130, adjusting range 0-250) with the program/radiation time +/- key as required until the downward travel from position 040 is smooth and without jerks.

### For programming:


The LED above the memory key flashes.  
Press the memory key (LED stops flashing).  
The LED above the R key flashes.  
Press the Return key R (LED stops flashing).  
The LED above the service key flashes.  
The PWM values are stored.







- **Service routine S.19 is required for checking and installing/removing the forehead support.**

1. Select Service routine **S.19** as describe in section '**Selecting service routines**'.
2. Briefly press the service key . The mA display indicates test step **01**.  
Select the desired test step with the kV +/- keys.

**Test step 01:** Driving to the zero point



3. Briefly press the service key . The mA display indicates **00**.  
The LED above the R key flashes.

4. Press the Return key R (LED is off during the travel).



Possible indications on the lateral control panel:

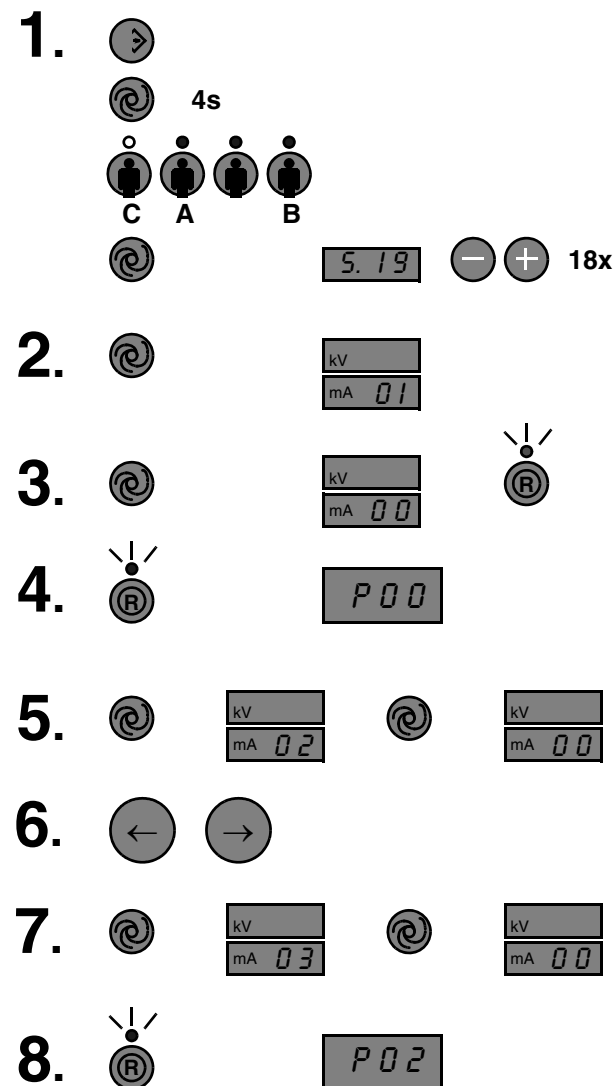
- E01: Reference point **not** reached within the permissible time.
- P00: Reference point reached within the permissible time.
- P01: Reference point reached without travel.

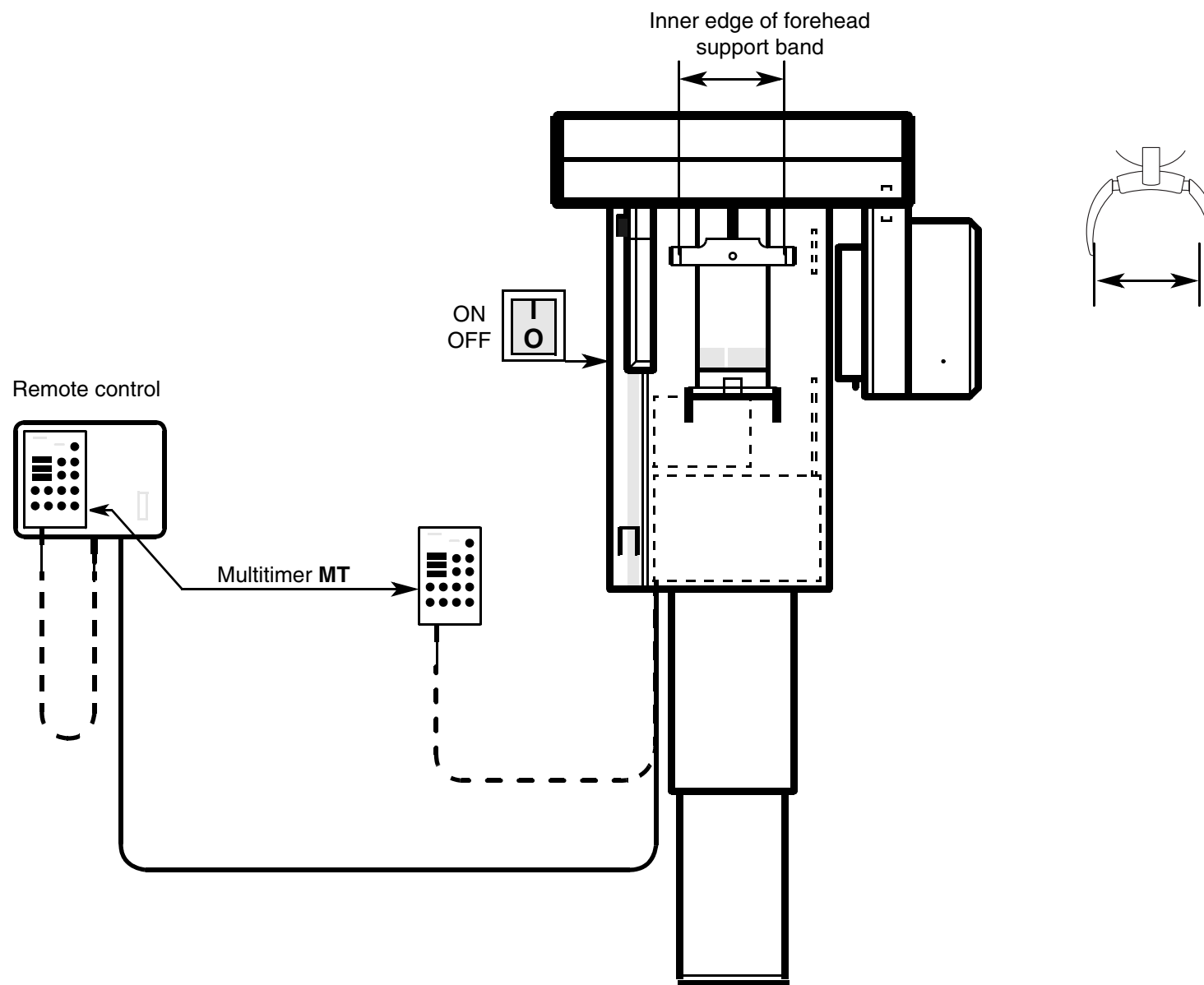
**Test step 02:** Normal travel

5. Briefly press the service key . The mA display indicates **02**.  
Briefly press the service key . The mA display indicates **00**.  
The LED above the service key lights up.
6. Use the forehead support adjustment key to travel through the entire adjustment range from 00.0 to 32.0.


**Test step 03:** Travelling to the installation position

7. Briefly press the service key . The mA display indicates **03**.  
Briefly press the service key . The mA display indicates **00**.  
The LED above the R key flashes.
8. Press the Return key R (LED continues to flash).  
Actuators M2 and M3 move 23 mm forward.  
Indication on the lateral control panel: P02  
The forehead support can now be installed or removed.






- **Service routine S.20 is required for testing and adjusting the forehead support width (jaw width).**


1. Select Service routine **S.20** as described in section '**Selecting service routines**'.
2. Briefly press the service key . The mA display indicates test step **01**. Select the desired test step with the kV +/- keys.

**Test step 01:** Check of forehead support (jaw width)



3. Briefly press the service key . The kV/mA display shows the voltage value present on the forehead support potentiometer. Voltage range between 3 V and 5 V.

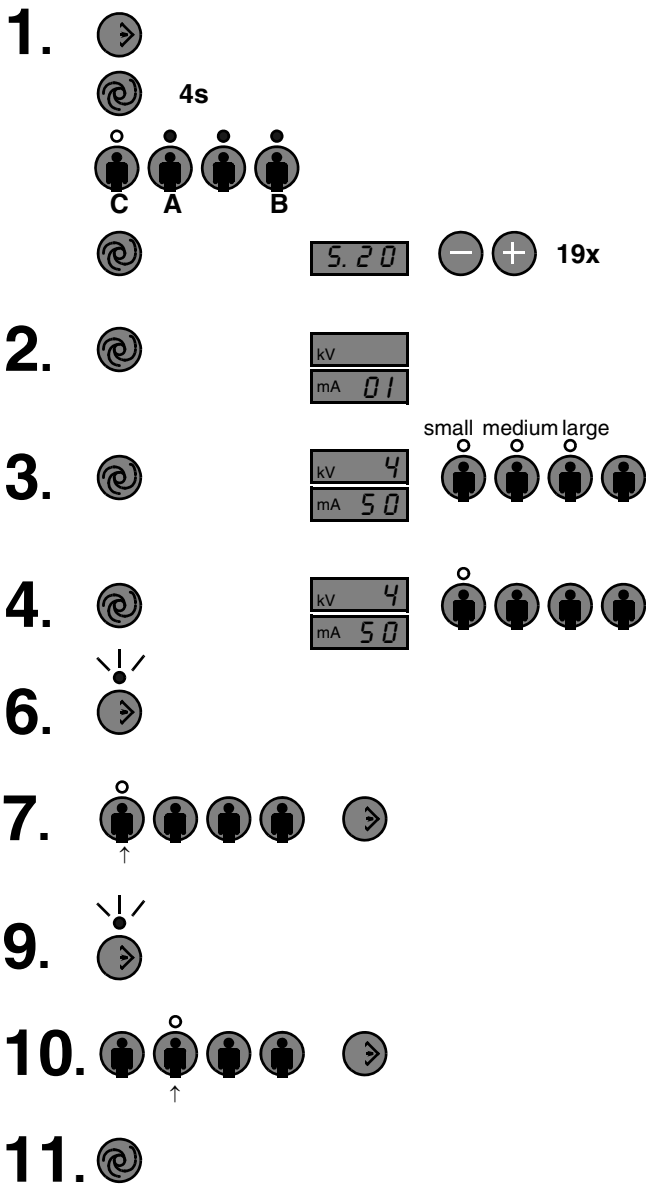
The forehead support width presently adjusted is indicated by one of the patient size LEDs.

| Patient symbol LED | Width at the forehead support  |                                        |
|--------------------|--------------------------------|----------------------------------------|
| large              | > 168 mm ± 2 mm                |                                        |
| medium             | 140 mm ± 5 mm to 170 mm ± 2 mm | Overlap caused by switching hysteresis |
| small              | < 140 mm ± 5 mm                |                                        |

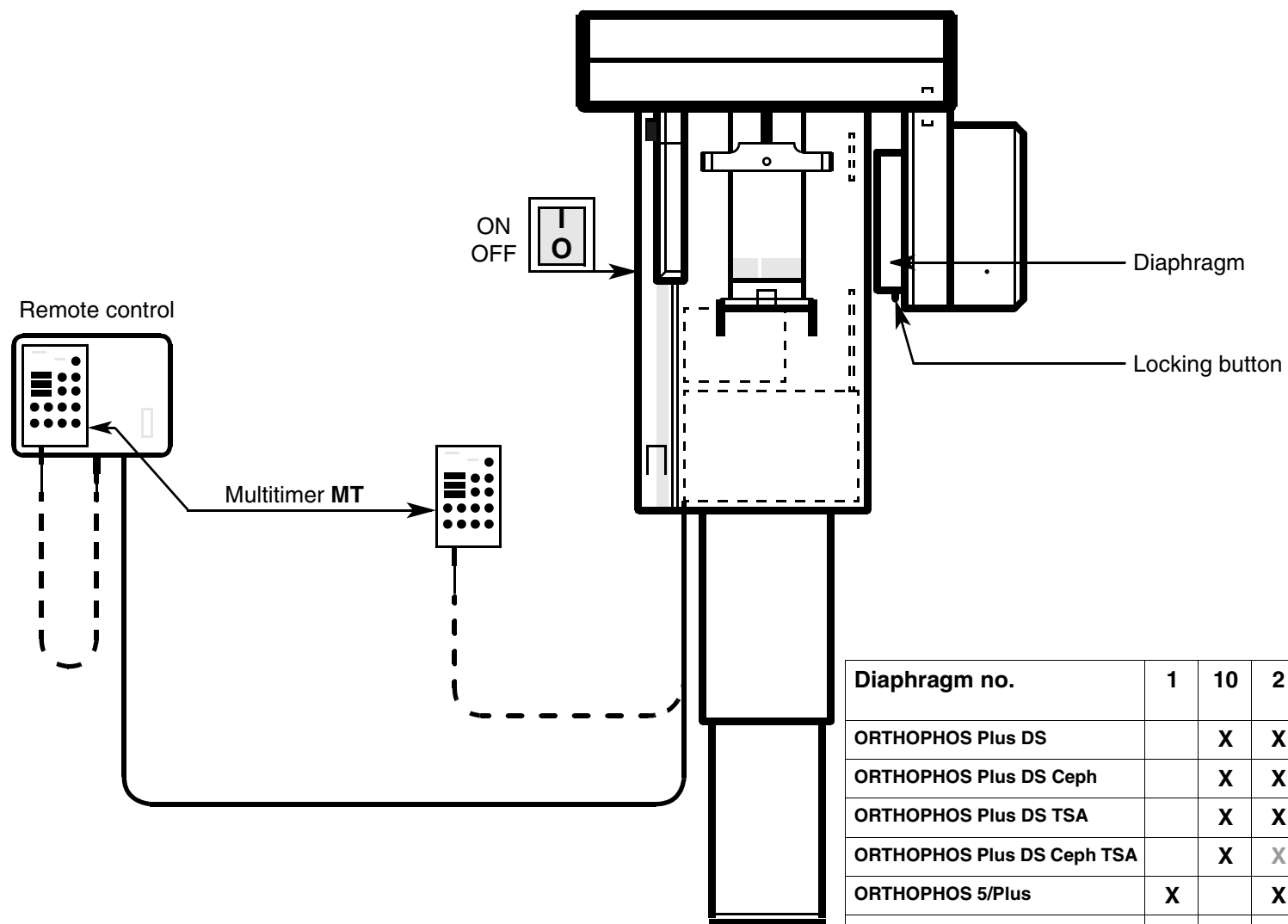
Briefly press the service key . The mA display indicates test step **02**

**Test step 02:** Programming the forehead support (jaw width)

4. Briefly press the service key . The kV/mA display shows the voltage currently present at the forehead support potentiometer. Voltage range between 3 V and 5 V.
5. With the **forehead support band** attached adjust the forehead support width to 140 mm using a measuring tape.
6. Press the memory key. The LED above the memory key flashes.
7. Press the key of the small patient symbol. The LED above the memory key stops flashing. The LED of the small patient symbol lights up.
8. Use the measuring tape to adjust the width of the forehead support to 168 mm.
9. Press the memory key. The LED above the memory key flashes.
10. Press the key for the second smallest patient symbol. The LED above the memory key stops flashing. The LED of the second smallest patient symbol lights up.
11. Briefly press the service key . The LED above the service key lights up.



## 5.19 Service routine S.20 Checking the forehead support width





| Diaphragm no.              | 1 | 10 | 2 | 3 | 4 | 30 | 40 | 11 | 12/13 |
|----------------------------|---|----|---|---|---|----|----|----|-------|
| ORTHOPHOS Plus DS          |   | X  | X |   |   |    |    |    |       |
| ORTHOPHOS Plus DS Ceph     |   | X  | X |   |   | X  | X  |    |       |
| ORTHOPHOS Plus DS TSA      |   | X  | X |   |   |    |    |    | X     |
| ORTHOPHOS Plus DS Ceph TSA |   | X  | X |   |   | X  | X  |    | X     |
| ORTHOPHOS 5/Plus           | X |    | X |   |   |    |    |    |       |
| ORTHOPHOS Plus Ceph        | X |    | X | X | X |    |    |    |       |
| ORTHOPHOS Plus TS          | X |    | X |   |   |    |    | X  |       |
| ORTHOPHOS Plus Ceph TS     | X |    | X | X | X |    |    | X  |       |


X = diaphragm not needed

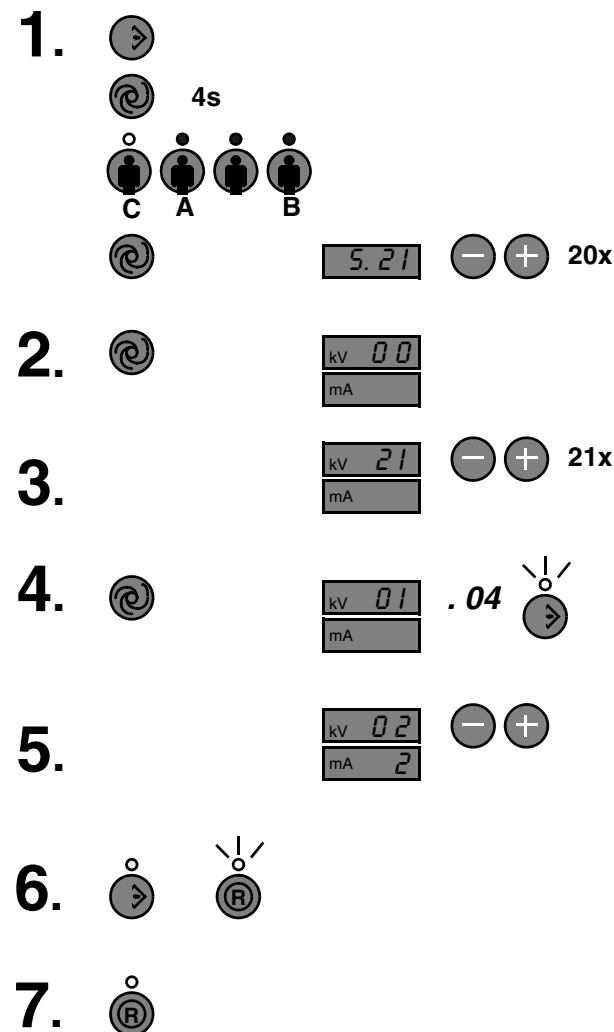
- **Service routine S.21 must be performed after replacing Board DX1, after replacing a diaphragm and after the Service routine S.09.**

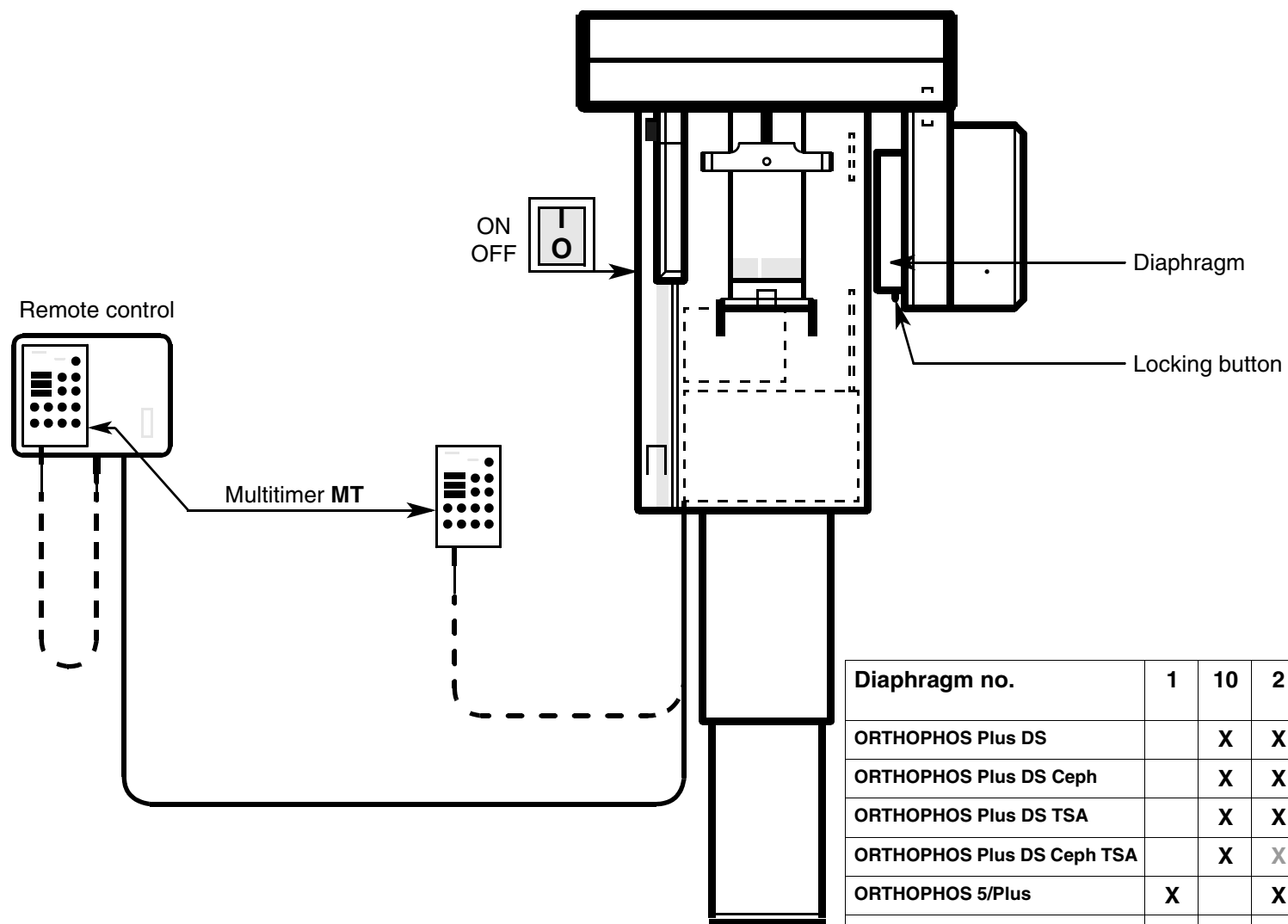
Each diaphragm has a number printed on its front panel.

1. Select Service routine **S.21** as described in section '**Selecting service routines**'.
2. Briefly press the service key .  
The kV display indicates **00**.
3. Enter service code 21.  
The kV display indicates **21**.
4. Briefly press the service key .  
The diaphragm installation position (**01** to **04**) is indicated on the kV display.  
**00** appears on the kV/mA display if the diaphragm wheel is not engaged.  
The LED above the memory key flashes.

#### Programming the diaphragm number:

5. Enter the diaphragm number of the engaged diaphragm with the kV/mA +/- key.  
The LED above the memory key flashes.
  6. Press the memory key (LED stops flashing).  
The LED above the R key flashes.
  7. Press the Return key R (LED stops flashing).  
The LED allocated to the diaphragm installation position lights up on the patient symbols.  
Example: Small patient symbol = diaphragm installation position 1.  
The diaphragm number is stored.  
With the diaphragm wheel select the next diaphragm and repeat the process from step 5, until all diaphragms are programmed.
- Briefly press the service key . Service routine S.21 is now exited.







| Diaphragm no.              | 1 | 10 | 2 | 3 | 4 | 30 | 40 | 11 | 12/13 |
|----------------------------|---|----|---|---|---|----|----|----|-------|
| ORTHOPHOS Plus DS          |   | X  | X |   |   |    |    |    |       |
| ORTHOPHOS Plus DS Ceph     |   | X  | X |   |   | X  | X  |    |       |
| ORTHOPHOS Plus DS TSA      |   | X  | X |   |   |    |    |    | X     |
| ORTHOPHOS Plus DS Ceph TSA |   | X  | X |   |   | X  | X  |    | X     |
| ORTHOPHOS 5/Plus           | X |    | X |   |   |    |    |    |       |
| ORTHOPHOS Plus Ceph        | X |    | X | X | X |    |    |    |       |
| ORTHOPHOS Plus TS          | X |    | X |   |   |    |    | X  |       |
| ORTHOPHOS Plus Ceph TS     | X |    | X | X | X |    |    | X  |       |

X = diaphragm not needed

- **Service routine S.21 must be performed after replacing Board DX1, after replacing a diaphragm and after the Service routine S.09.**


Each diaphragm has a number printed on its front panel.

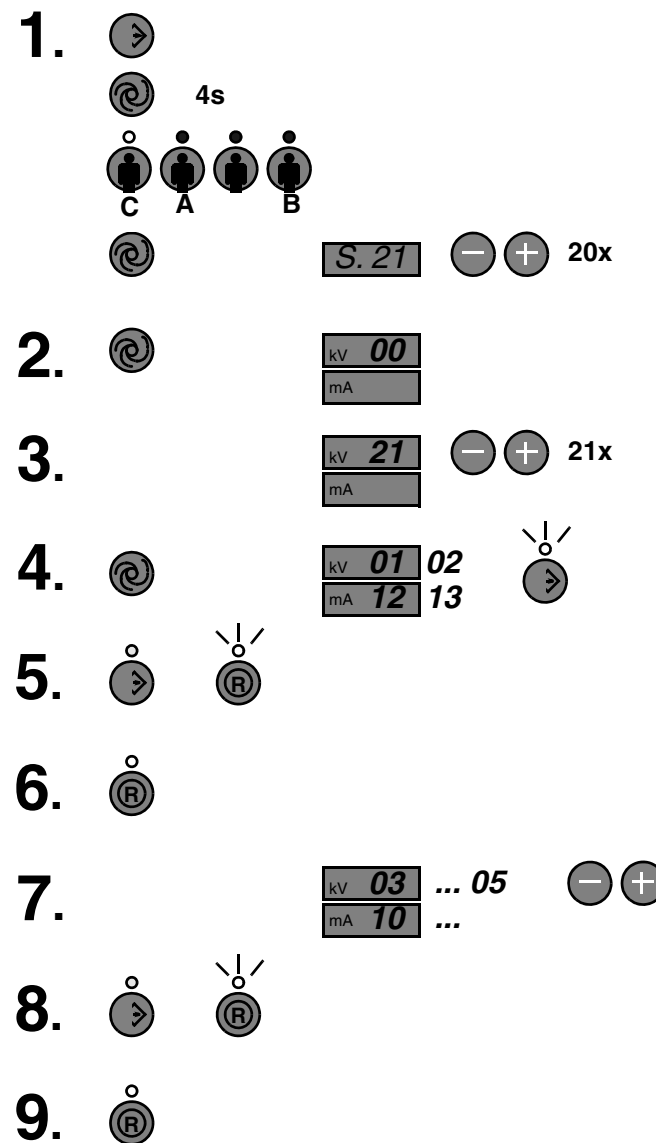
1. Select Service routine **S.21** as described in section 'Selecting service routines'.
2. Briefly press the service key . The kV display indicates **00**.
3. Enter service code 21. The kV display indicates **21**.
4. Briefly press the service key . For TSA the diaphragm installation location (**01 to 05**) is shown on the kV display, 01=12, 02=13 are permanently allocated.  
**00** appears on the kV/mA display if the diaphragm wheel is not engaged.  
The LED above the memory key flashes.

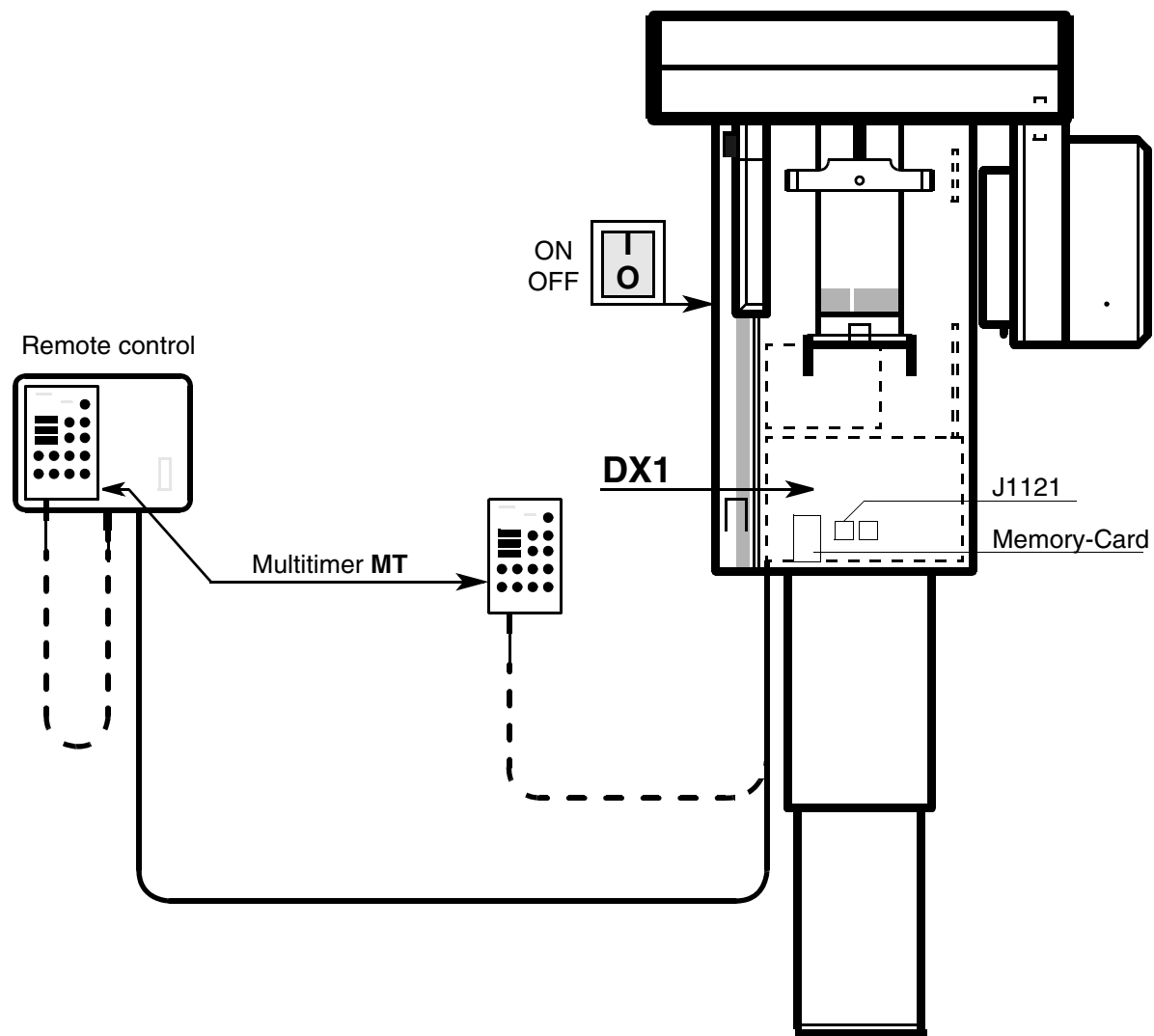
#### Programmieren der TSA-Blendennummer:

- Select the TSA diaphragm. Set the mandibular position with the adjusting wheel (diaphragm 12, yellow). The kV/mA display indicates 01 12.
5. Press the memory key (LED stops flashing). The LED above the R key flashes.
  6. Press the Return key R (LED stops flashing).
- Set the maxillary position with the adjusting wheel (diaphragm 13, blue). The kV/mA display indicates 02 13.
5. Press the memory key (LED stops flashing). The LED above the R key flashes.
  6. Press the Return key R (LED stops flashing).  
The LED above the small patient symbol lights up. The TSA diaphragms are programmed.

#### Programming the Pan/Ceph diaphragm number:

- Use the diaphragm wheel to set to the Pan/Ceph diaphragm.
7. Enter the diaphragm number of the engaged diaphragm with the kV/mA +/- key.  
The LED above the memory key flashes.
  8. Press the memory key (LED stops flashing). The LED above the R key flashes.
  9. Press the Return key R (LED stops flashing).  
The LED allocated to the diaphragm installation location lights up on the patient size symbols.  
Example: Small patient symbol = diaphragm installation position 1.  
The diaphragm number is stored.  
With the diaphragm wheel select the next diaphragm and repeat the process from step 7, until all diaphragms are programmed.
- Briefly press the service key . Service routine S.21 is now exited.






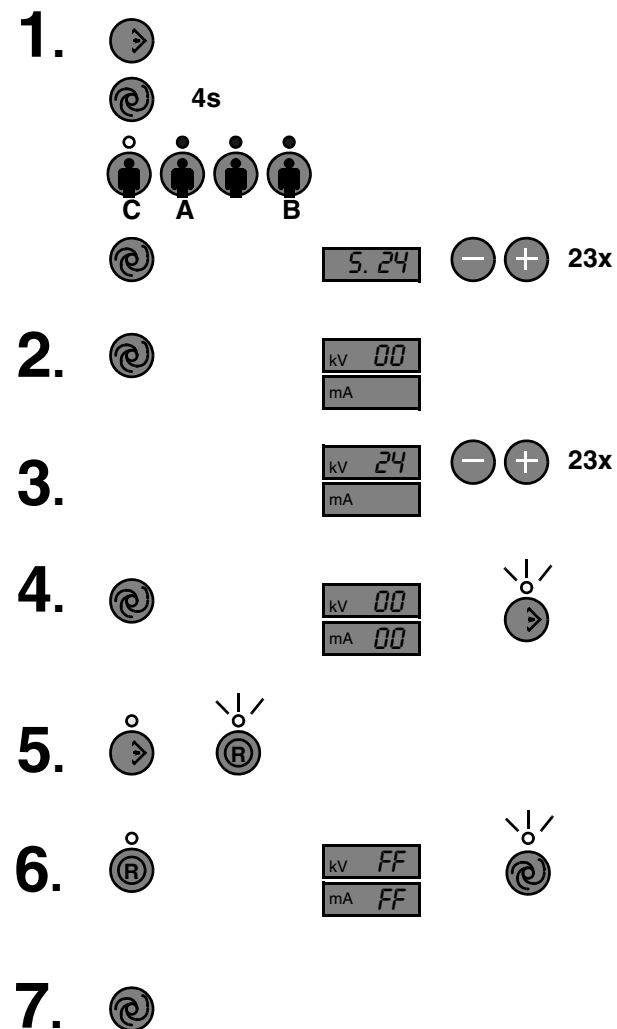


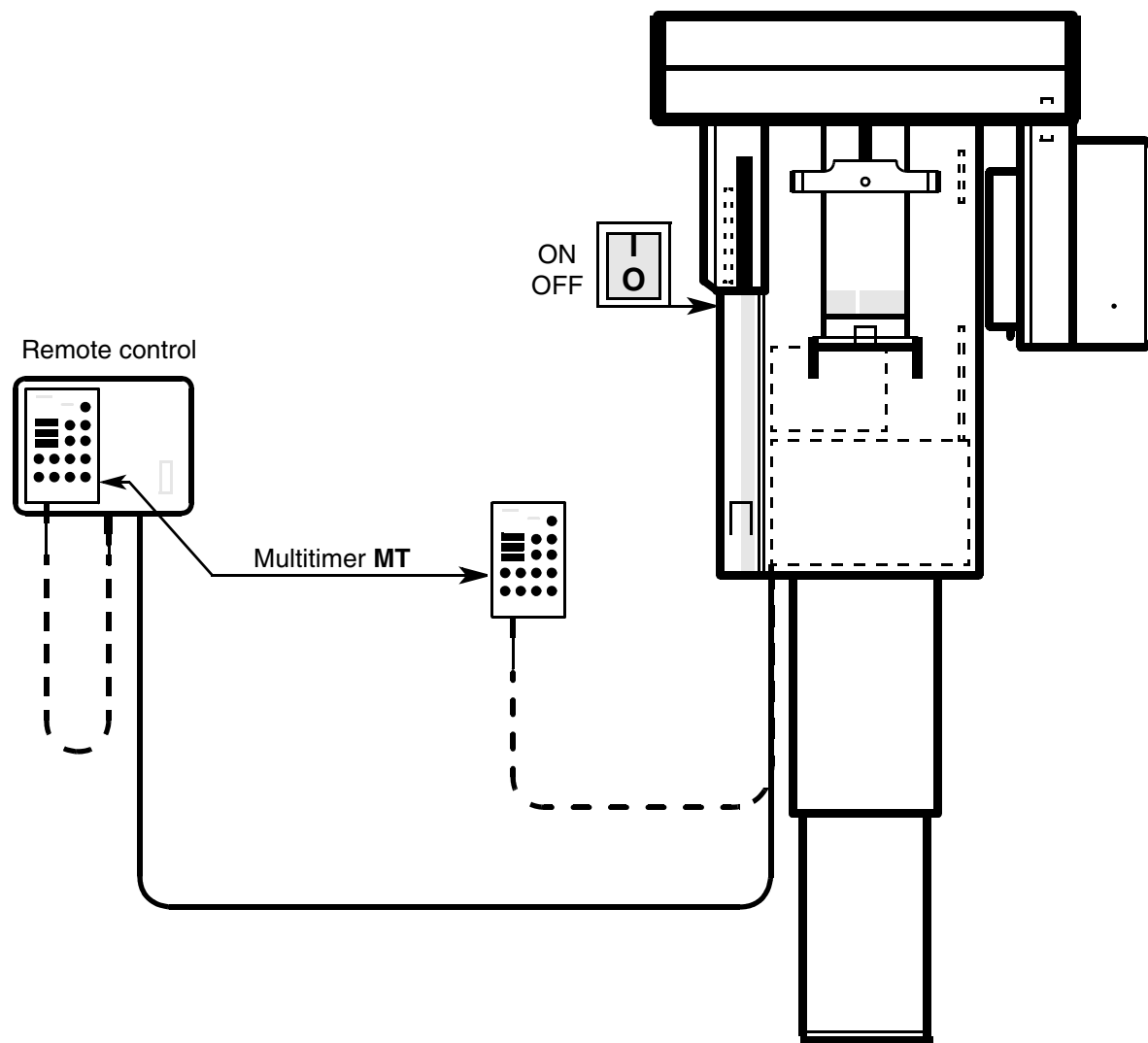


- Service routine S.24 must be performed after replacing the memory card and GAL J1121 on DX1.

• **Software update of EEPROM J115 with service routine S.24.**

1. Select Service routine **S.24** as described in section 'Selecting service routines'.
2. Briefly press the service key . The kV display indicates **00**.
3. Enter service code 24. The kV display indicates **24**.
4. Press the Service key  briefly.  
The LED above the Memory key starts flashing and **00** appears on the kV/mA display.
5. Press the Memory key. (The LED stops flashing).  
The LED above the **R** key starts flashing.
6. Press Return key **R**. (The LED stops flashing).  
The boot software is updated and **FF** appears on the kV/mA display.  
The LED above the Service key lights up.
7. Press the Service key  briefly. The LED above the Service key and the kV/mA display are no longer illuminated.  
The program quits service routine S.24.







To exit the service routines switch the unit OFF and ON again.

54 53 571 D 3297  
D 3297.077.01.10.02 04.2007


- **Service routine S.25 must be performed for adjusting and checking the film/screen combination or the kVmA step series.**

1. Select Service routine **S.25** as described in section 'Selecting service routines'.
2. Briefly press the service key . The kV display indicates **00**.
3. Enter service code 25. The kV display indicates **25**.
4. Briefly press the service key . The LED above the memory key flashes.

#### ORTHOPHOS 5/Plus/Plus Ceph only

Value **20** or the previously programmed value must appear on the mA display. If this is not the case, adjust a film/screen combination with the kV/mA +/- key like e.g.

|        | Lanex Medium | Lanex Regular | XXX     |
|--------|--------------|---------------|---------|
| Film   | 20 - 29      | 30 - 39       | 40 - 49 |
| TMAT G | 20           | 33            | 40      |

When changing the film/screen combination, perform **Service routine S.26 AES (Automatic Exposure Preselection)** to correct the measured AES voltage,  see page 5 - 71!

#### ORTHOPHOS Plus DS/Plus DS Ceph only from software version V031


On the mA display, the value **2A** or the preprogrammed value must be indicated; if it does not appear, a kVmA step series can be adjusted with the kV/mA +/- keys,

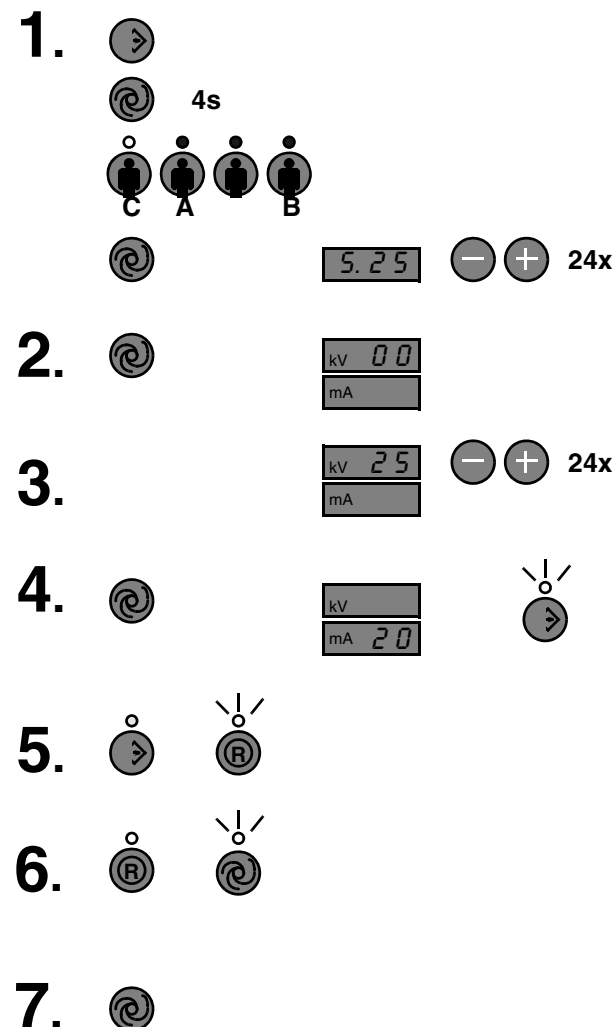
e.g.

|                        |                                                                                                                                                                         |                     |     |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----|
| <b>2A</b>              | Step series                                                                                                                                                             | <b>60/3 - 90/6</b>  | Pan |
| <b>1A</b>              | Step series                                                                                                                                                             | <b>60/9 - 90/12</b> | Pan |
| from V035<br><b>4A</b> | You can change between the two step series by actuating one of the two smaller ( <b>60/3 - 90/6</b> ) or one of the two larger ( <b>60/9 - 90/12</b> ) patient symbols. |                     | Pan |

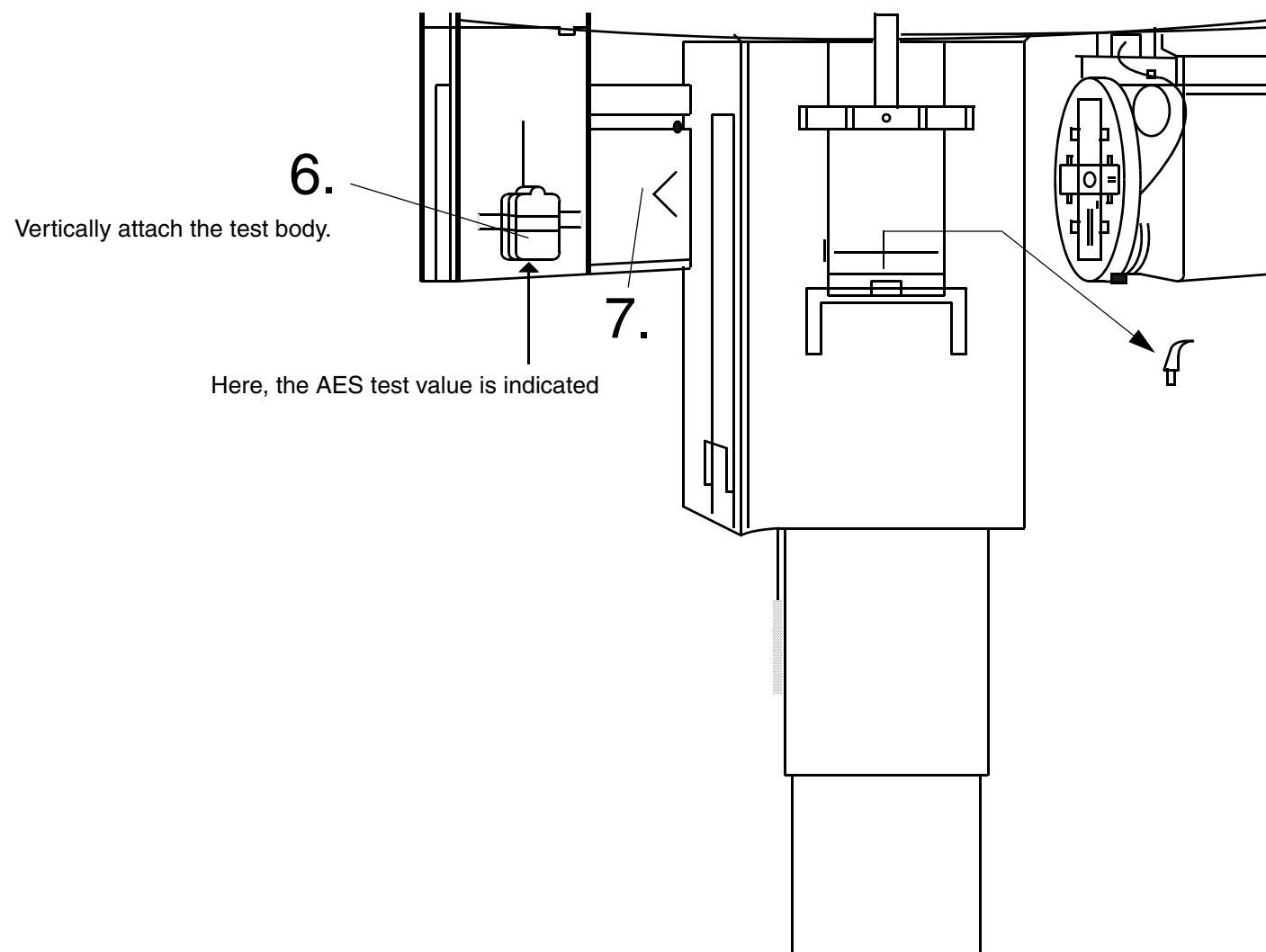
(Other characteristic values are not permissible.)

#### Programming procedure:

5. Press the memory key (LED stops flashing). The LED above the R key flashes.
6. Press the Return key R (LED stops flashing). The LED above the service key flashes.
7. Briefly press the service key . Service routine S.25 is now exited.





## 5.23 Service routine S.25 Adjusting the film/screen combination or the kVmA step series



ORTHOPHOS 5/Plus only

- **Service routine S.26 is intended for adjusting DX8 for preparation of a measuring protocol for the test body measurement (constancy check).**

- **Checking and adjusting AES**

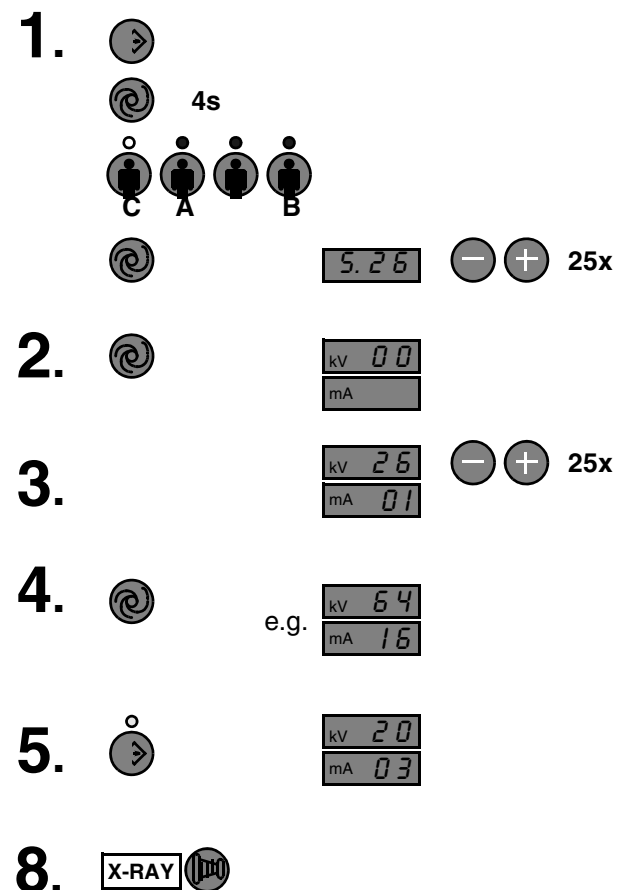
1. Select Service routine **S.26** as described in section '**Selecting service routines**'.
2. Briefly press the service key .  
The kV display indicates **00**.
3. Enter service code 26.  
The kV display indicates **26**.  
Test step 01 appears on the mA display.
4. Briefly press the service key .  
The kV/mA display indicates the AES measurement step required for the film/screen system.

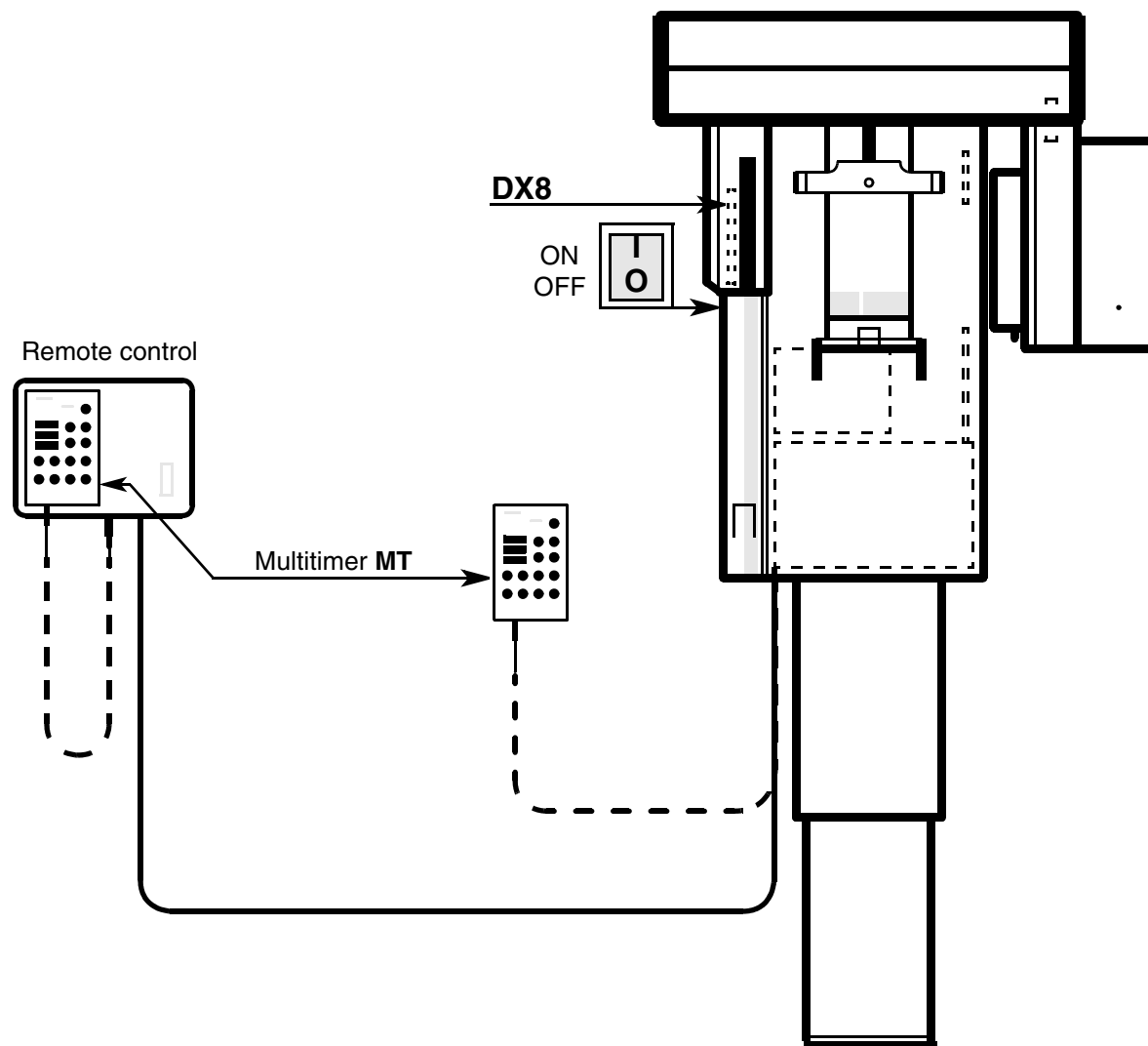
| FiFo | kV | mA |
|------|----|----|
| 20   | 64 | 16 |
| 30   | 61 | 16 |
| 33   | 61 | 16 |
| 40   | 64 | 16 |

The LEDs above the patient symbols light up.

5. Press the memory key,  
the following appears for 3 sec: the film/screen value on the kV display,  
the density correction value on the mA display.
6. At the lower part of the secondary diaphragm attach and secure the **test body supplied with this unit** with adhesive tape. Observe its position; the test body must be oriented exactly vertically!  
NOTE: With the ORTHOPHOS TS transversal unit, first the diaphragm insert must be installed in the wider secondary diaphragm before attaching the test body.
7. Place a film in the cassette. Fully insert the cassette until it engages (see Operating Instructions).  
Adjust the diaphragm wheel to **PAN 1** diaphragm.

**continued on next page**

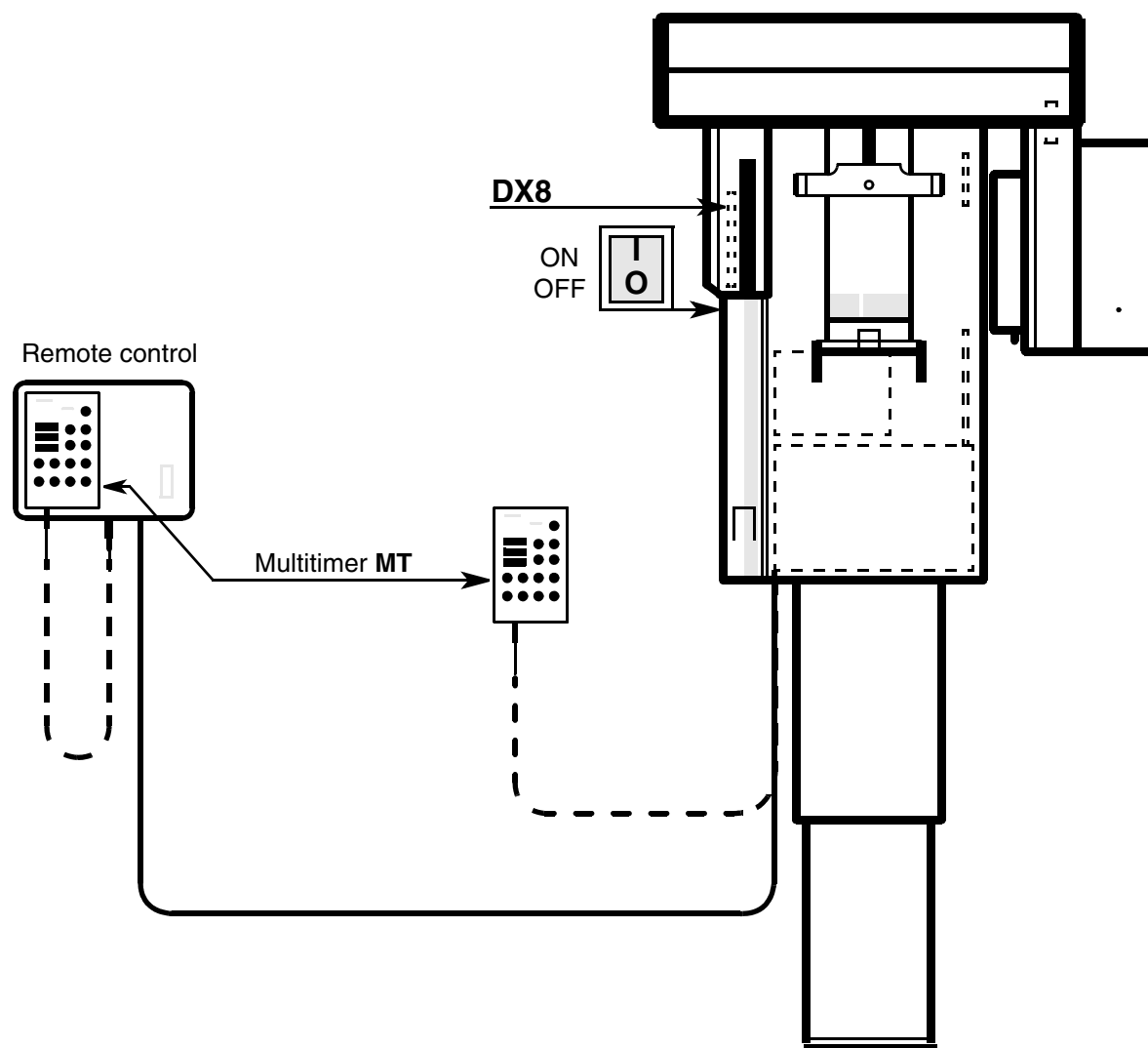




**Continued**

- The unit must not be exposed to any bright light source.
  - **Nothing** must be inserted in the bite-block holder.
  - Make the unit to exposure readiness (see Operating Instructions).
  - **The ring must be set to the start position.**
8. Press the X-ray button and hold it pressed.  
**RADIATION** is released for the duration of 1 second.
9. Then check the displays on the multimeter.
- |                         |                                    |
|-------------------------|------------------------------------|
| <b>Program display:</b> | Measuring step (total of 10 steps) |
| <b>kV/mA display:</b>   | AES voltage (10 measured values)   |
- Press the „+“ key (program selection) thirteen times
- |         |                                                |
|---------|------------------------------------------------|
| 1 - 10: | Measuring values (0-10 V on the kV/mA display) |
| 11:     | Density switch (e.g. 03).                      |
| 12:     | AES pointer (e.g. 3).                          |
| 13:     | Correction value (e.g. 7).                     |
- The AES voltage noted on the phantom for the film-screen system selected must be indicated as the tenth voltage value measured (tolerance  $\pm 0.1$  V).
10. Press the **R** key (LED stops flashing). Acknowledge the result step with the **R** button.
- Is this indication is not present, thoroughly recheck the "X-ray beam adjustment" once more (see section "Checking and adjusting the X-ray beam").  
Correct as required by slightly rotating the diaphragm (so that it is positively engaged).  
Perform the diaphragm adjustment search for the maximum voltage value.
  - Repeat the phantom exposure until the correct value is set. See point 8.

**continued on next page**





**continued**

- **AES setting after changing the film-screen system.**  
**Changing from a Lanex Medium (S=250) to a Lanex Regular (S=400) film-screen system**

1. Before changing to a different film-screen system first check the current AES value measured by comparing with the voltage value given on the phantom (System 250).  
Proceed according to the routine Checking and adjusting AES.  
In case of discrepancies perform the measures above to bring the system back to the optimally adjusted state.
2. With Service routine S.25 set the film-screen characteristic 33 specified for the Lanex Regular + TMAT G/RA system (S=400).
3. Then select Service routine S.26.  
Following the same procedure as for Checking and adjusting AES adjust potentiometer R27 on DX8 again.  
turning to the right: increases measured value  
turning to the left: decreases measured value

- This must give the following AES voltage measurement (tenth measured value)  
(tolerance  $\pm 0.1$  V):

Case 1: The phantom specifies an AES voltage for the system S=400.

In this case you must set the measured value given on the phantom for (S=400).

Case 2: The phantom specifies only the AES voltage for the system S=250.

In this case use the following correction procedure:

Set 0.15 V less than the value given on the phantom for (S=250).

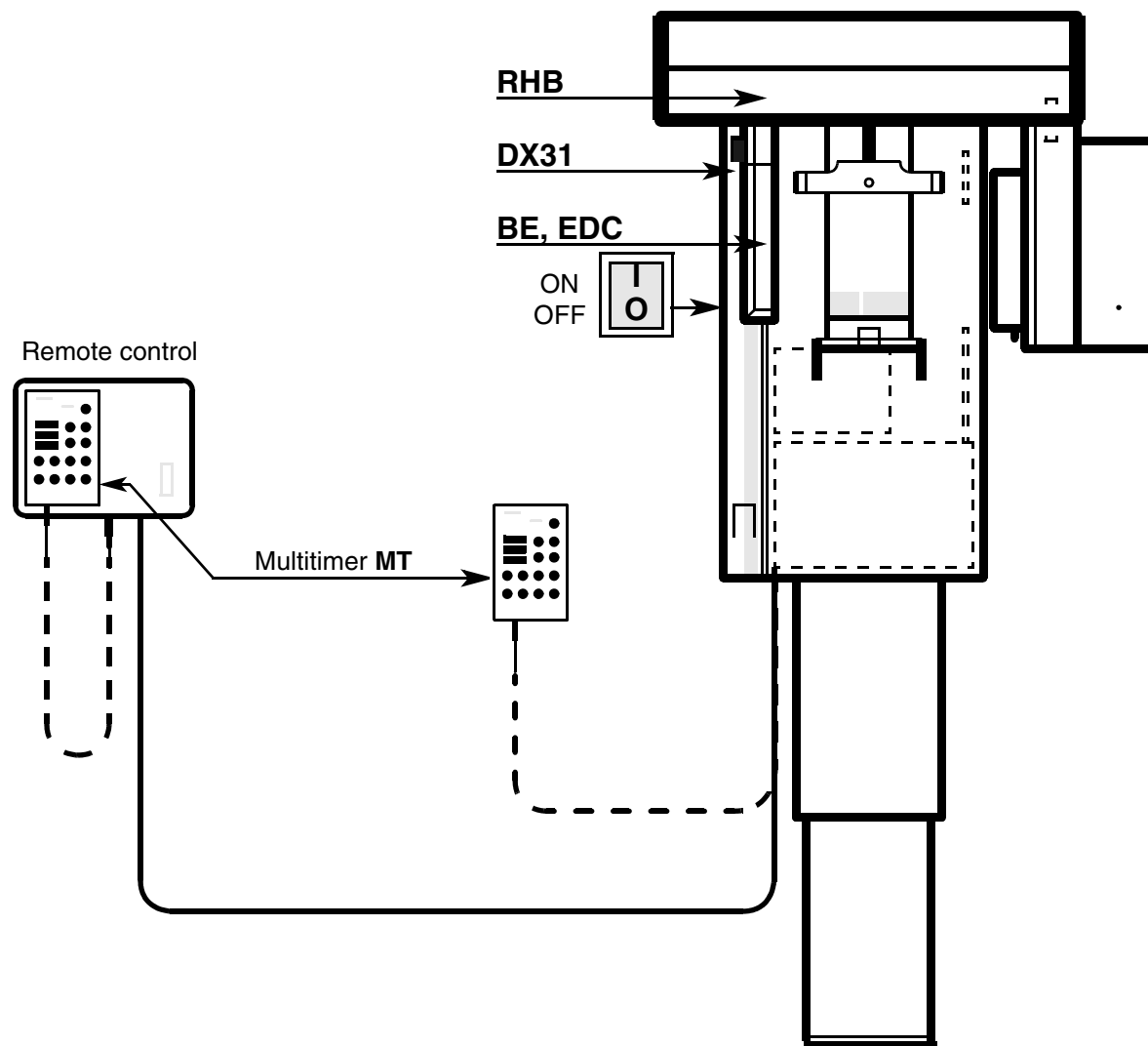
Example (typical):

|               |         |                    |
|---------------|---------|--------------------|
| printed value |         | = required setting |
| for S=250     | -0.15 V | for S=400          |
| 2.21 V        | -0.15 V | = 2.06 V           |


- Note the correct setting for the AES value (10th measured value)  
(notation analogous to that for System 250)
- Note: If the DX8 board version is E3 or older it can happen that the AES measured value for the System 400 cannot be set (potentiometer at right endstop). In this case replace the DX8 (with at least version E3) and adjust the AES again with the activated film-screen system (S=400).

---


## **5.24 Service routine S.26 Checking and adjusting AES (Automatic Exposure Preselection)**




**For ORTHOPHOS PLus DS Service routine S.32,  
for ORTHOPHOS Plus DS Ceph Service routine S.33**

- **Service routine S.32/S.33 is required for checking the image receptor.**
- 1. Select Service routine **S.32/S.33** as described in section 'Selecting service routines'.
- 2. Briefly press the service key . The mA display indicates test step 01.  
Select the desired test step with the kV +/- keys.


**Test step 01:** Checking the voltage supply for the image receptor  
The supply voltages can be measured on board RHB or DAB.

- 3. Briefly press the service key . **dd dd** is indicated on the kV/mA display.
- 4. Press the X-ray button. For 240 seconds the image receptor is ready for exposure.  
The operating time of 240 sec on the program/radiation time display counts backward.  
The LED above the R key flashes.
- The readiness for exposure may be turned off earlier by pressing the R key.
- The cool-down interval is 1/2 the exposure time and can be retrieved by pressing the X-ray key.

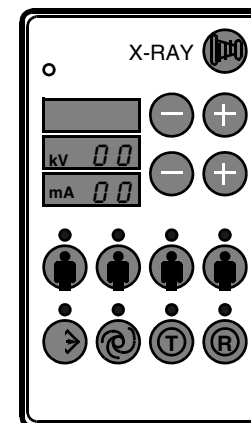
**Test step 02:** Clock pulses for image information

- 5. Briefly press the service key .  
The TDI pulse frequency is indicated in Hertz (0800 = 800 Hz) on the kV/mA display.
- The frequency can be adjusted in the range from 1000 Hz to 100 Hz with the kV +/- keys.
- 6. Press the X-ray button. For 240 seconds the image receptor is ready for exposure.  
The operating time of 240 sec on the program/radiation time display counts down.  
The LED above the R key flashes.
- The image receptor provides pulses for permanent image information (signals IMAGE and TDI are generated). Check the LEDs on board DEB or XAB OP.
- The readiness for exposure may be turned off earlier by pressing the R key.
- The cool-down interval is 1/2 the exposure time and can be called up by pressing the X-ray key.



**Test step 03:** Detection of plug-in slot

- 7. Briefly press the service key .  
The kV display indicates whether or not the image receptor has been detected.
- kV display: 00 means image receptor not plugged in,  
01 means image receptor plugged in.

| Test step 01 |    |             |
|--------------|----|-------------|
| kV display   | 00 | VCC missing |
|              | 01 | VCC OK      |
| mA display   | 00 | reset       |
|              | 01 | no reset    |




## Patient symbol LEDs




|  |  | kV | mA | Description                                          | Required measures                                                                                                                                           |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----|----|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| X                                                                                |                                                                                   | 01 | 00 | Wrong EDC operating mode                             | Check installation and version of SIDEXIS and memory card.                                                                                                  |
| X                                                                                |                                                                                   | 02 | 00 | ID could not be read                                 | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
| X                                                                                |                                                                                   | 04 | 00 | General initialization error at image receptor end   | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
| X                                                                                |                                                                                   | 08 | 00 | General parameter error                              | Check installation and version of SIDEXIS and memory card.                                                                                                  |
| X                                                                                |                                                                                   | 00 | 01 | VAP voltage not present                              | Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79.                                                              |
| X                                                                                |                                                                                   | 00 | 02 | VAN voltage not present                              | Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79                                                               |
| X                                                                                |                                                                                   | 00 | 04 | VDD voltage not present                              | Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79                                                               |
| X                                                                                |                                                                                   | 00 | 08 | VSN voltage not present                              | Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79                                                               |
| X                                                                                |                                                                                   | 00 | 10 | VSP voltage not present                              | Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79                                                               |
| X                                                                                |                                                                                   | 00 | 20 | Digital part not in Reset                            | Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79                                                               |
| X                                                                                |                                                                                   | 00 | 40 | Overflow during exposure                             | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
| X                                                                                |                                                                                   | 00 | 80 | Error leading to exposure disable                    | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 00 | 01 | FPGA module could not be programmed                  | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 00 | 02 | No external flex board connected                     | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 00 | 04 | No valid programming file present in FLASH memory    | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 01 | 00 | Data loss of FPGA configuration during exposure      | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 02 | 00 | FPGA could not be programmed for exposure            | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 04 | 00 | Binning stage not supported by EDC                   | Check installation and version of SIDEXIS and memory card.                                                                                                  |
|                                                                                  | X                                                                                 | 08 | 00 | Incorrect default position for sensor adjustment     | Check installation and version of SIDEXIS and memory card.                                                                                                  |
|                                                                                  | X                                                                                 | 10 | 00 | Incorrect default value for clock out direction      | Check installation and version of SIDEXIS and memory card.                                                                                                  |
|                                                                                  | X                                                                                 | 20 | 00 | An excessively high clock out frequency has occurred | Check installation and version of SIDEXIS and memory card.<br>Proceed acc. to section "Correction of error message E4 01/E4 08/E4 11",<br>☞ see page 3 - 79 |
|                                                                                  | X                                                                                 | 40 | 00 | Clock out error of FPGA                              | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |
|                                                                                  | X                                                                                 | 80 | 00 | ADC signal level error during exposure               | EDC problem, if error occurs frequently → replace image receptor.                                                                                           |

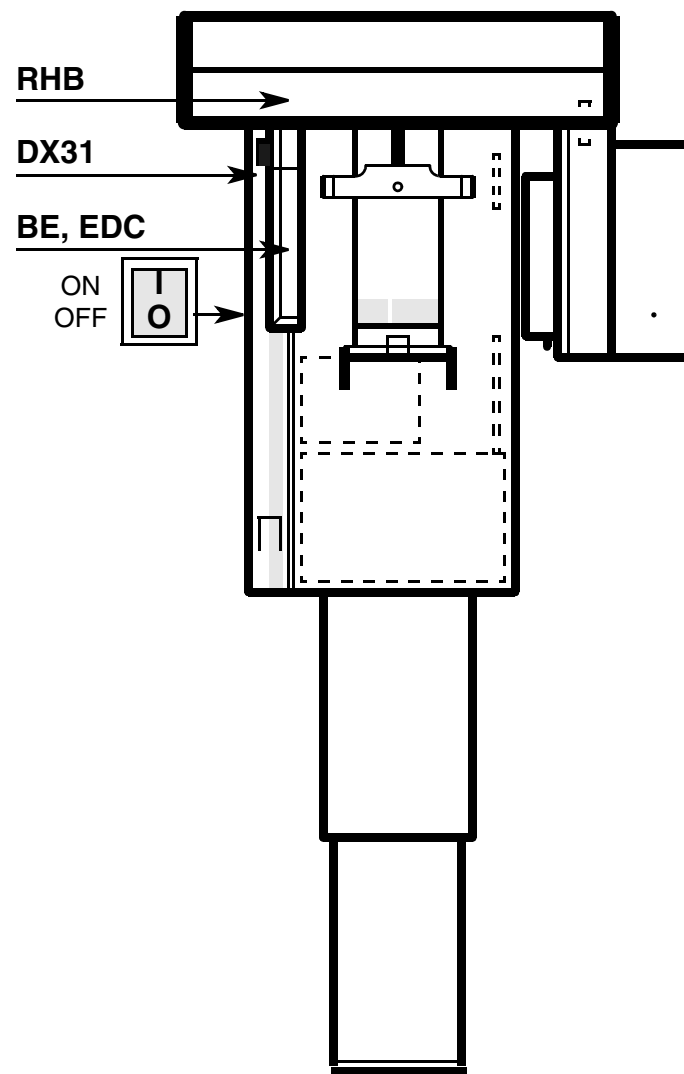
**Test step 04:** Read-out of the image receptor error memory (possible only for TSA).

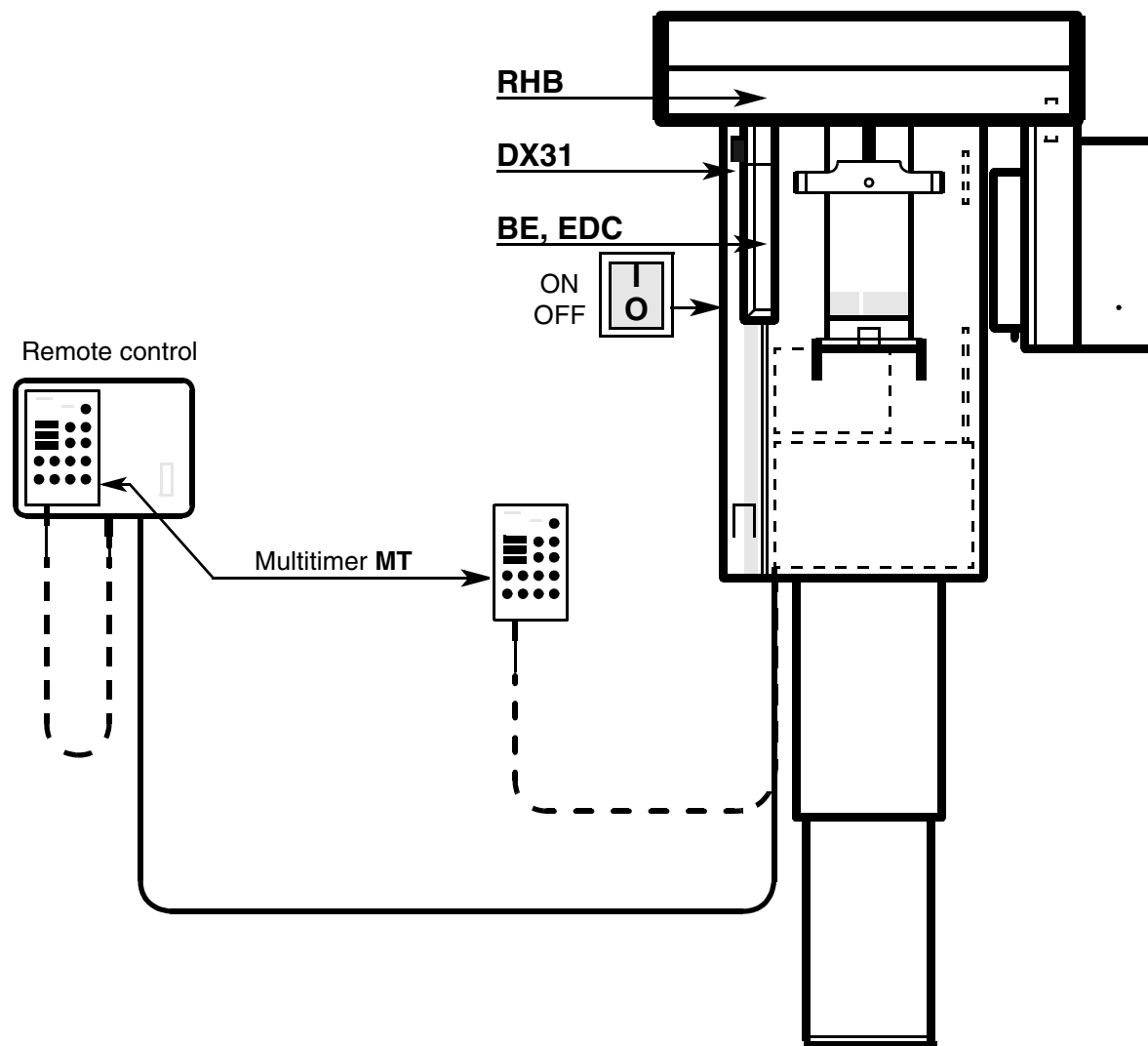
NOTE: SIDE XI must not be enabled for an exposure.

8. Briefly press the service key . The LED above key R flashes.  
The program/radiation time display indicates the number of the entry in the error memory. The kV/mA display shows the status byte and the two smaller patient symbol LEDs light up.
- You can change over between display of the status byte and display of the extended status byte as follows:  
Pressing one of the two smaller patient symbol keys causes the status byte to be displayed and the two patient symbol LEDs to light up.  
Pressing one of the two larger patient symbol keys causes the **extended** status byte to be displayed and these two patient symbol LEDs to light up.
- Pressing the Test key recalls the status of the radiation counter for the entry currently displayed. The radiation counter is displayed on the program/radiation time and on the kV/mA display (max. 8 digits) and the Test LED is lit.  
Pressing the Test key again switches back to the status byte display and causes the Test LED to switch off.
- You can change back and forth between the individual entries in the error memory by pressing the program/radiation time keys. A maximum of 10 entries is displayed.
- Note: Multiple errors may also occur in added form, e.g. 04 + 08 = 0C.


**Test step 05:** Erasing the image receptor error memory; possible only with TSA

9. Press the Service key  briefly.  
The kV/mA display reads **FF FF**.  
The LED above the Memory key flashes.
10. Press the Memory key.  
The LED above the R key flashes.
11. Press the R Return key.  
The error memory is erased.  
The kV/mA display reads **00 00**.  
The LED above the Service key  lights up.
12. Press the Service key  briefly.



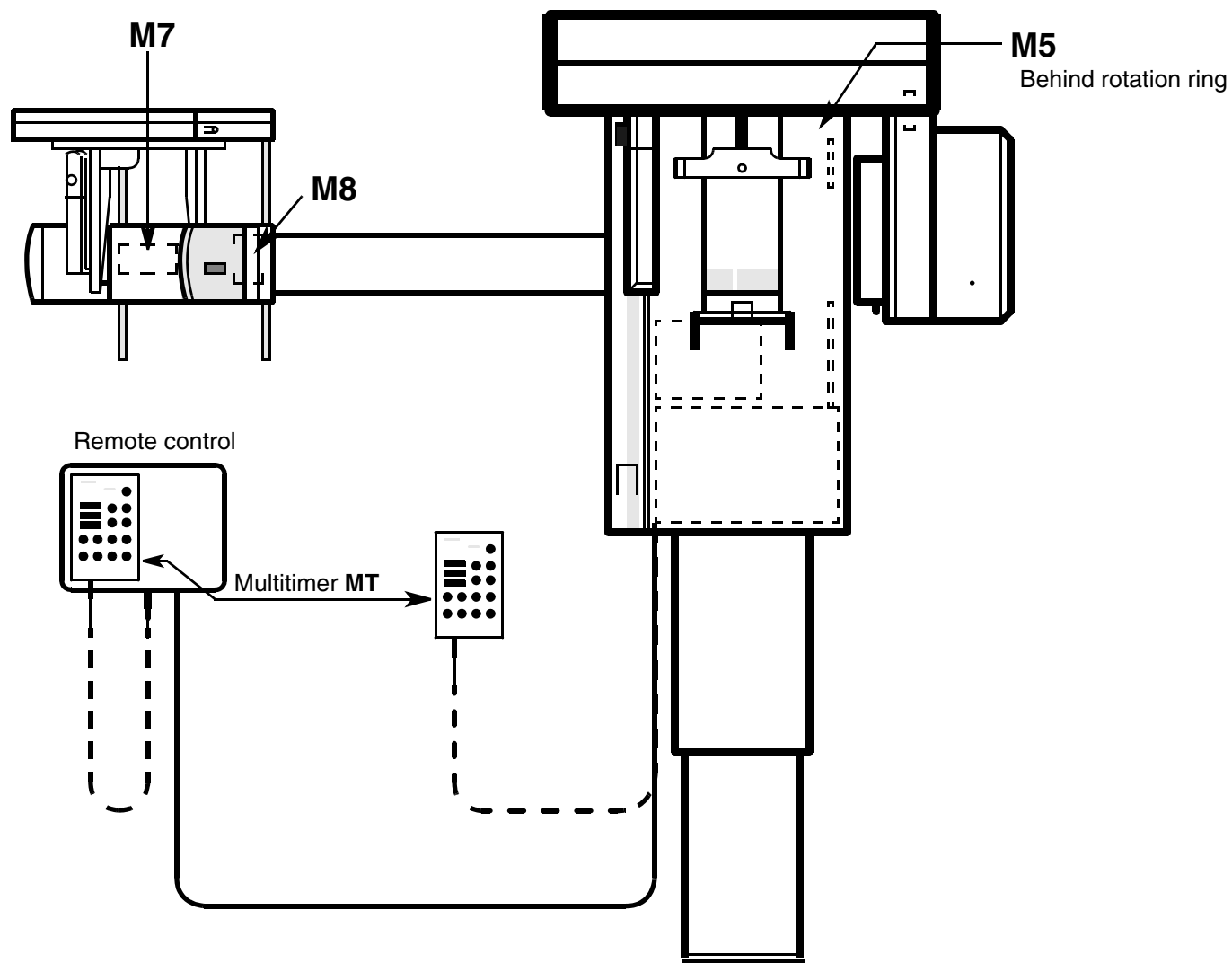
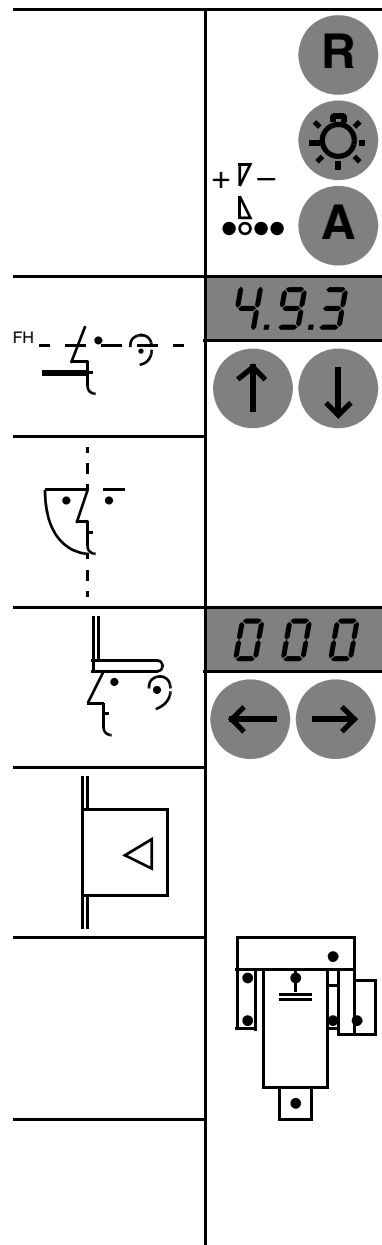


**Test step 06:** Motor test of TSA image receptor

13. Press the Service key  briefly.  
The kV/mA display reads **00 00**.  
The R LED does not flash, indicating that no valid values are available for the image receptor.
14. Press the X-RAY key. The motor test then starts.  
The TSA image receptor moves to several different positions in succession.  
When this process has been completed, the R-LED starts flashing. The travel status is then indicated on the kV display and the motor status is shown on the mA display.

| kV display | Meaning                                                            |
|------------|--------------------------------------------------------------------|
| 00         | No error                                                           |
| 08         | "Bottom" light barrier not reached                                 |
| 10         | "Bottom" light barrier reached,<br>but not within the allowed time |
| 20         | "Bottom" light barrier has not been left                           |

| mA display | Meaning                                   |
|------------|-------------------------------------------|
| 00         | No error                                  |
| 01         | Motor: Short-circuit to GND               |
| 02         | Motor: Open load                          |
| 03         | Motor: Short-circuit to GND and open load |
| 04         | Motor: Temperature pre-alarm              |






## To exit the service routines switch the unit OFF and ON again.


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- **Service routine S.34 is required for checking the Ceph arm.**



- Prepare the unit for cephalometry.

1. Select Service routine **S.34** as described in section '**Selecting service routines**'.
2. Briefly press the service key . The mA display indicates test step **01**.  
Select the desired test step with the kV +/- keys.

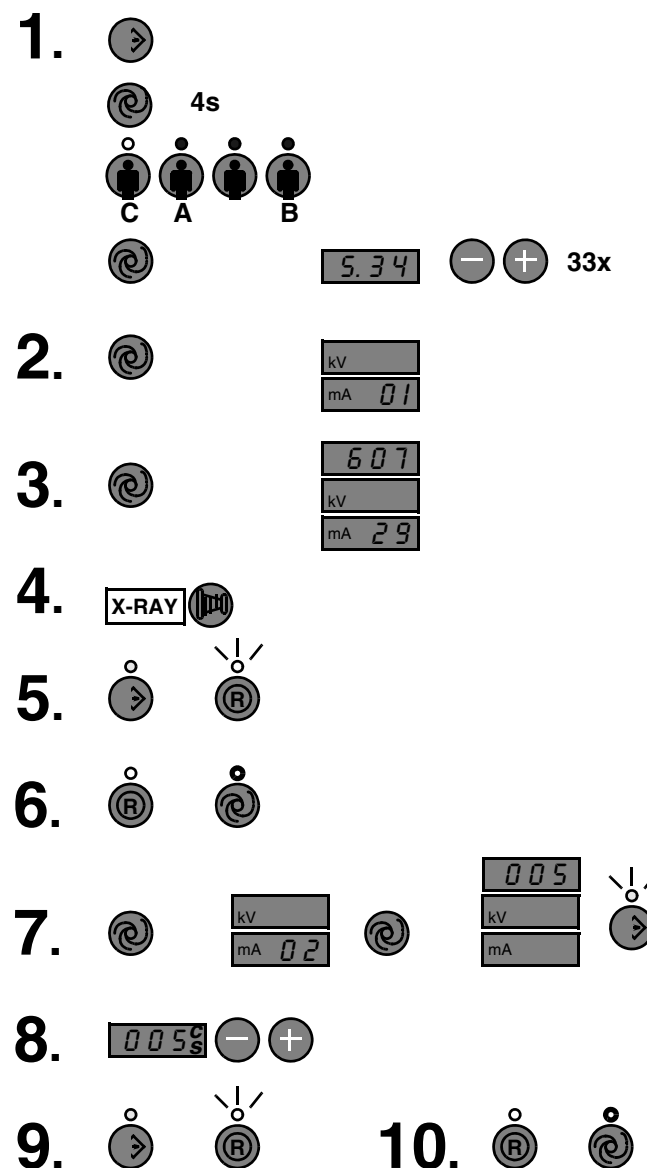
### Test step 01: Storing the FH position on the Cephalometer

3. Briefly press the service key . The LED above the memory key flashes.  
The position values of the Cephalometer appear on the multimer displays.
4. **Press the X-ray button and hold it pressed during the entire adjustment process.**  
The Cephalometer (M7) first travels to the upper position and then to the lower position.  
Then it drives to the FH position (position in the lower third).  
This FH position can be altered with the height adjustment keys  $\uparrow\downarrow$  on the unit as required by the customer (approx.  $\pm 30$  mm).
5. Press the memory key (LED stops flashing). The LED above the R key flashes.
6. Press the Return key R (LED stops flashing). The LED above the service key lights up.  
The Ceph position is now stored.

### Test step 02: Compensating for the toothed belt backlash

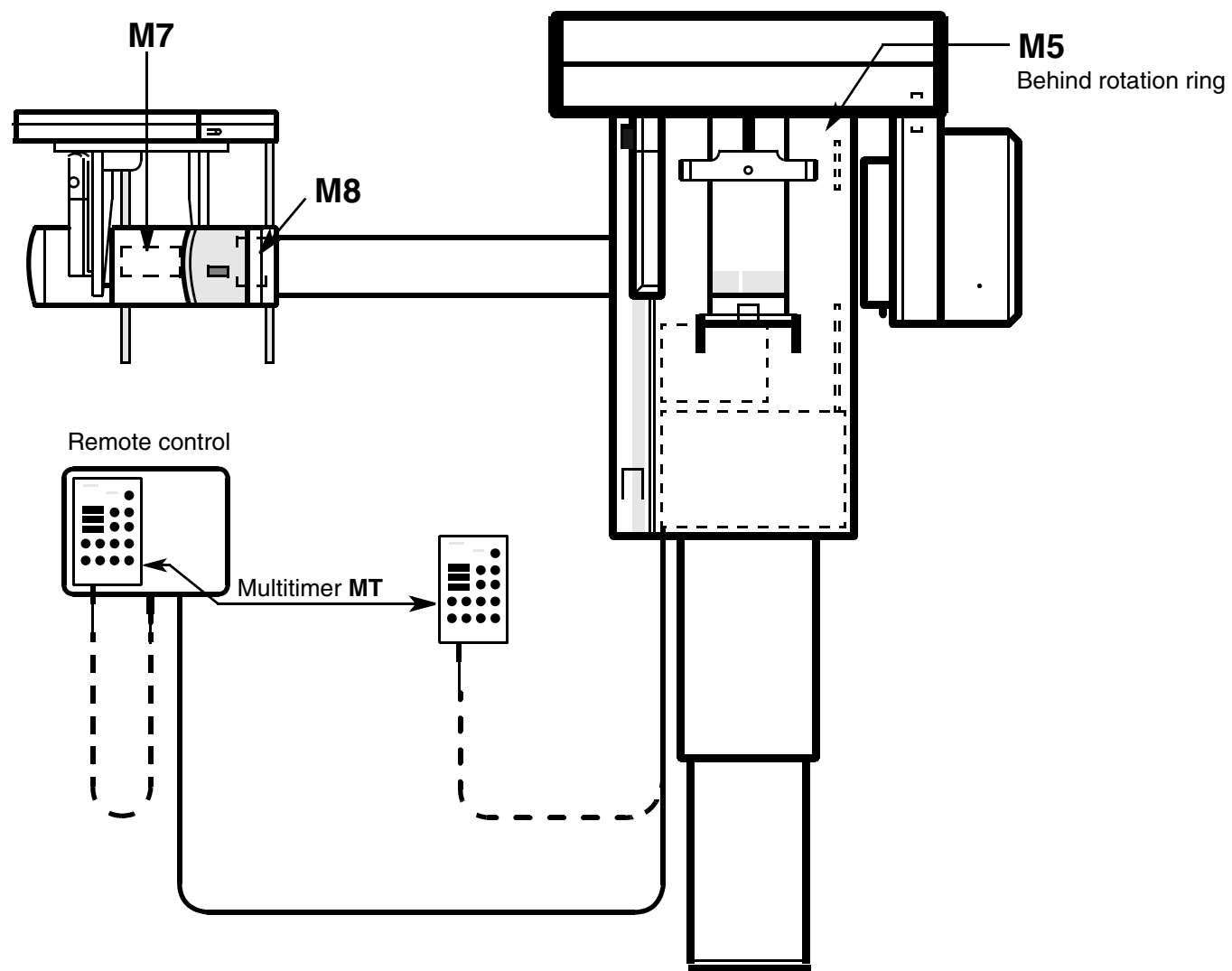
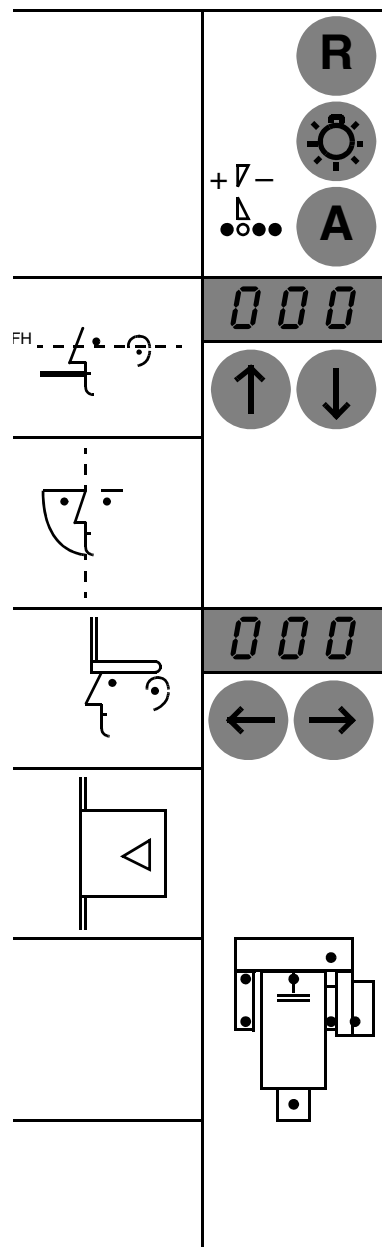
7. Briefly press the service key . The mA display indicates test step **02**.  
Briefly press the service key .  
The last value stored appears on the program/radiation time display.  
The current height is indicated on the lateral control panel.  
The memory LED flashes.
8. Use the program/radiation time keys to change the pre-tension of the toothed belt between 000 and 030 max (030 corresponds to about one rotation of the drive wheel). Test the backlash with the height adjustment key. The HV motor (M5) and the Ceph motor (M7) must start smoothly and without jerks.  
NOTE: Upon a change of direction the pulse disk of the HV motor M5 rotates faster for a brief period.
9. Press the memory key (LED stops flashing). The LED above the **R** key flashes.
10. Press the Return key **R** (LED stops flashing). The LED above the service key lights up.  
The pretension of the toothed belt is now stored.

continued on next page



## 5.26 Service routine S.34 Ceph arm service

Cephalometer model No 33 14 320





## To exit the service routines switch the unit OFF and ON again.



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### Continued



**Test step 03:** Storing the position of the patient diaphragm for asymmetrical and symmetrical exposures

11. Briefly press the service key . The mA display indicates test step 03.  
Briefly press the service key . The LED above the **R** key flashes.
12. Press the return key **R**. The patient diaphragm M8 travels to the inner and outer limits and then stops in the center.
13. With the + key of the mA display drive the patient diaphragm to the outer stop.  
With the - key of the mA display move it back inward for approx. 1 - 2 mm.
14. Press the memory key.
15. Press the Return key **R**.  
The position for asymmetrical exposures is now stored.  
The patient symbol LED 1 lights up.
16. Drive the patient diaphragm to the inner limit with the - key of the mA display.  
Drive the patient diaphragm approx. 3mm outward with the + key of the mA display.
17. Press the memory key.
18. Press the Return key **R**. The LED above the service key lights up.  
The position for symmetrical exposures is stored.  
The patient symbol LED 4 lights up.

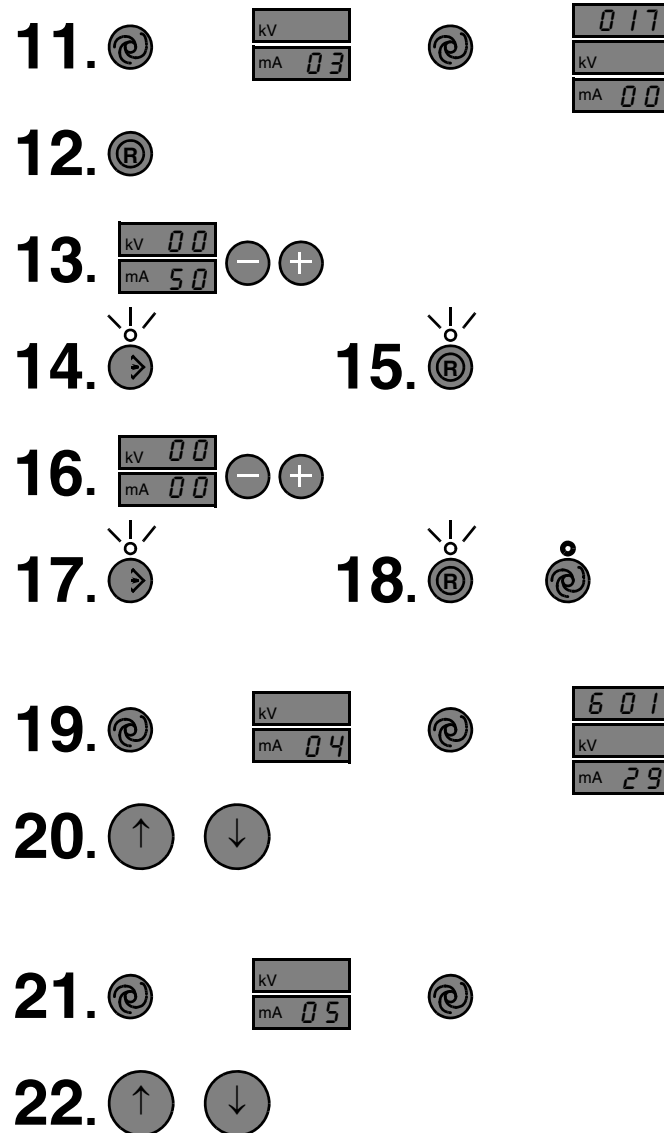
### Test step 04: Free movement of Ceph motor

19. Briefly press the service key . The mA display indicates test step 04.  
Briefly press the service key .
20. The Cephalometer (M7) can be moved alone upward or downward with the height adjustment keys on the lateral control panel.

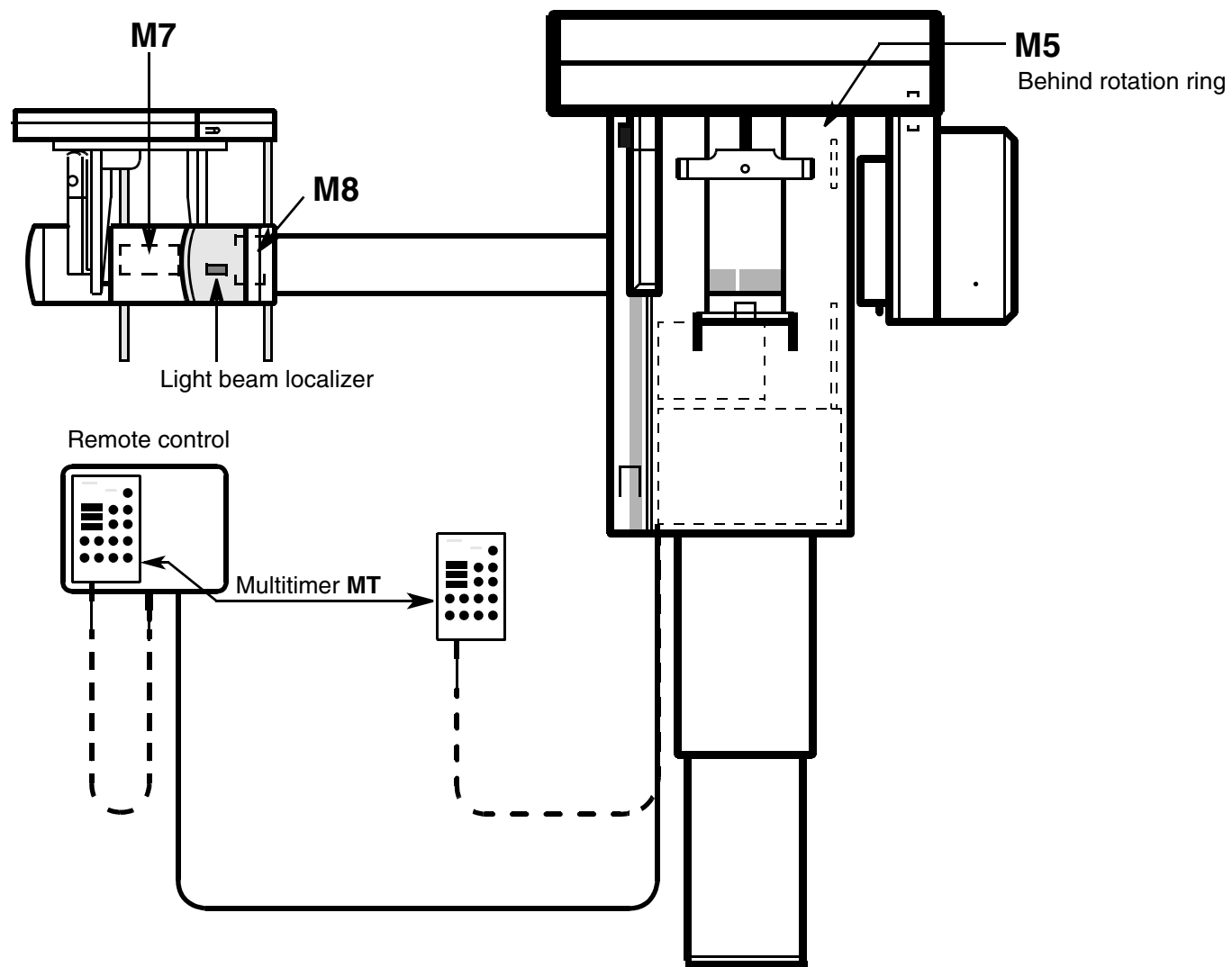
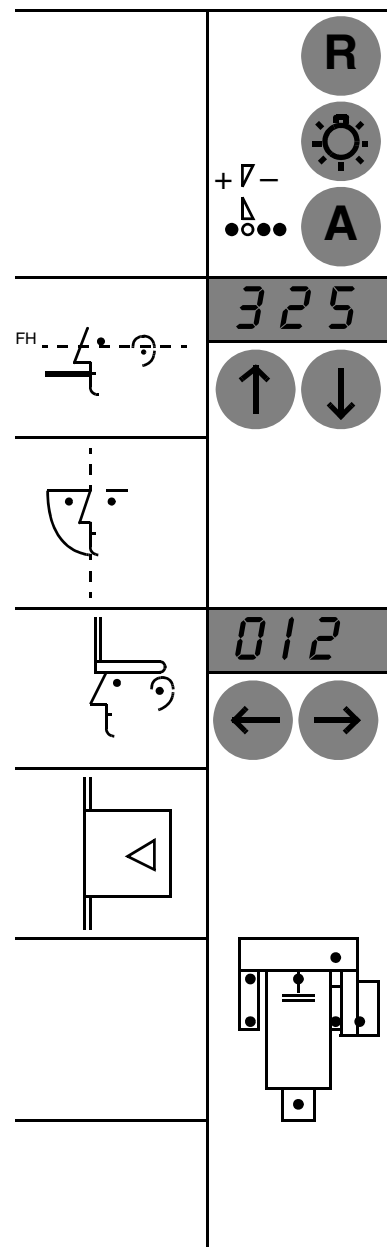
### Test step 05: Free movement of the patient diaphragm

21. Briefly press the service key . The mA display indicates test step 05.  
Briefly press the service key .
22. The patient diaphragm (M8) can be moved across the entire adjustment range with the height adjustment keys on the lateral control panel or the kV +/- keys on the multimeter.  
ATTENTION: Electronics is not designed for continuous operation. After each travel observe a waiting time of 30 seconds.

continued on next page




## 5.26 Service routine S.34 Ceph arm service





Continued

**Test step 06:** Only possible in the factory

**Test step 07:** Packaging position of Ceph arm


23. Briefly press the service key . The mA display indicates test step 07.
24. Press the X-ray button and hold it pressed. The Cephalometer (M7) drives to the upper end position and then to the packaging position (40 mm above the support). The 4 patient symbol LEDs light up. Now release the X-ray key.

**Test step 08:** Checking the Ceph light-beam localizer

25. Briefly press the service key .  
The mA display indicates test step 08.  
Briefly press the service key .
26. The light-beam localizer can be switched on or off with the T key on the multitimer.

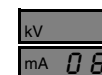
23. 



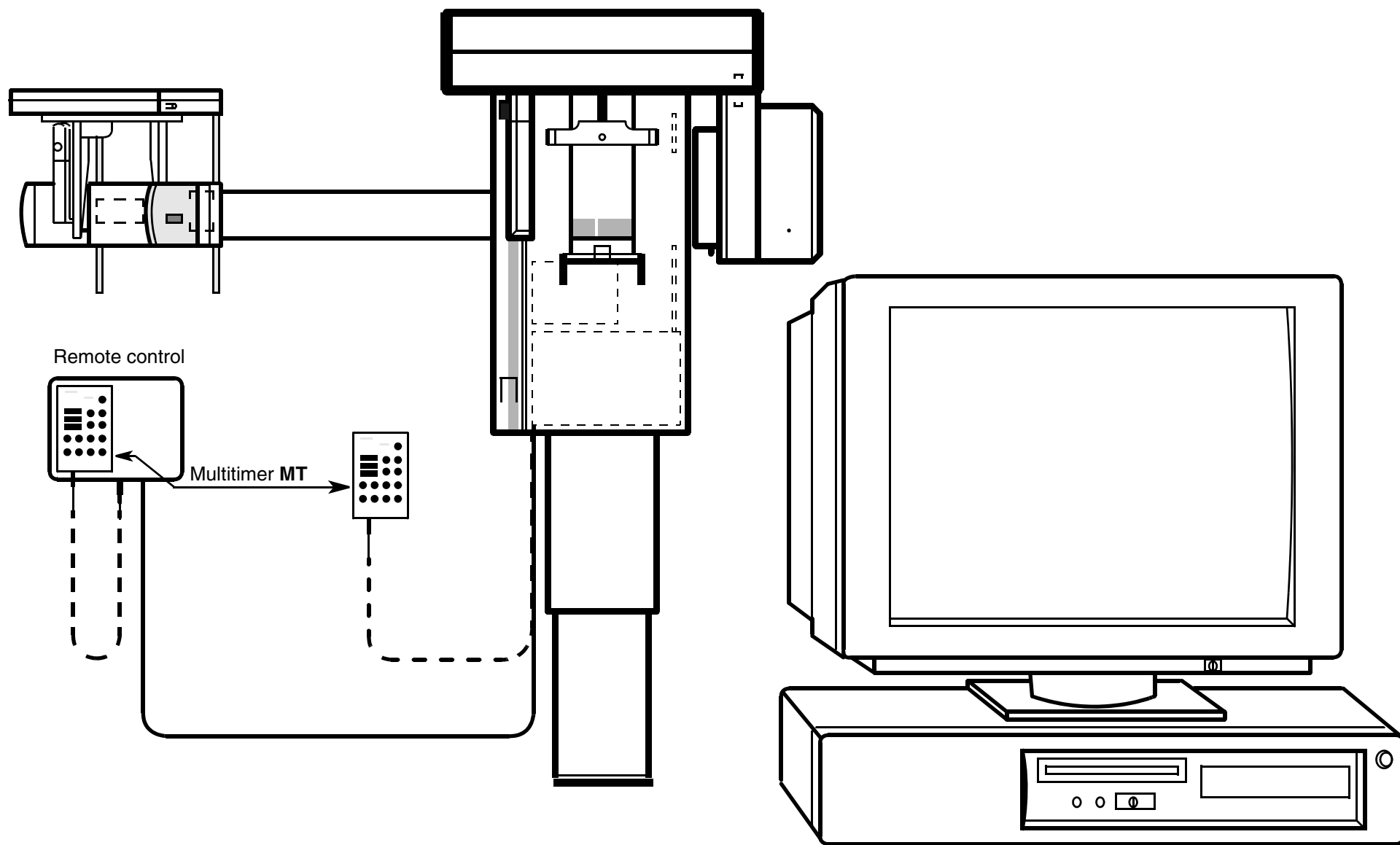
24. X-RAY 



25. 




26. 



### ORTHOPHOS Plus DS only

- Service routine S.35 is required for checking the readiness for exposure.
- Set the readiness for exposure as described in section 'Setting exposure readiness on the PC'. Select **Factory service (2)**.

1. Select Service routine **S.35** as described in section 'Selecting service routines'.

2. Briefly press the service key .

Up to software version **V027** of the Memory card, pressing the Service button on the kV indication immediately causes a display.

From software version **V030.1** of the Memory card, press the Service button again to select **Test step 01**.


- The image receptor hardware Active signal is output to the kV display

|    | XOP/DEB                                                                | XAB OP                                                |
|----|------------------------------------------------------------------------|-------------------------------------------------------|
| 00 | PC voltage supply DEB_XPWR is not present.<br>LED V950 (DEB) VCC = OFF | XAB OP not in operation<br>LED V10 (XAB OP) VCC = OFF |
| 01 | PC voltage supply DEB_XPWR is present.<br>LED V950 (DEB) VCC = ON      | XAB OP in operation<br>LED V10 (XAB OP) VCC = ON      |

- The signal ACTIVE is indicated on the mA display.

00: ACTIVE is not present

01: ACTIVE is present

3. Briefly press the service key .

From software version V031 of the Memory card Test step 02 is displayed.

### Test step 02: Setting the Active signal

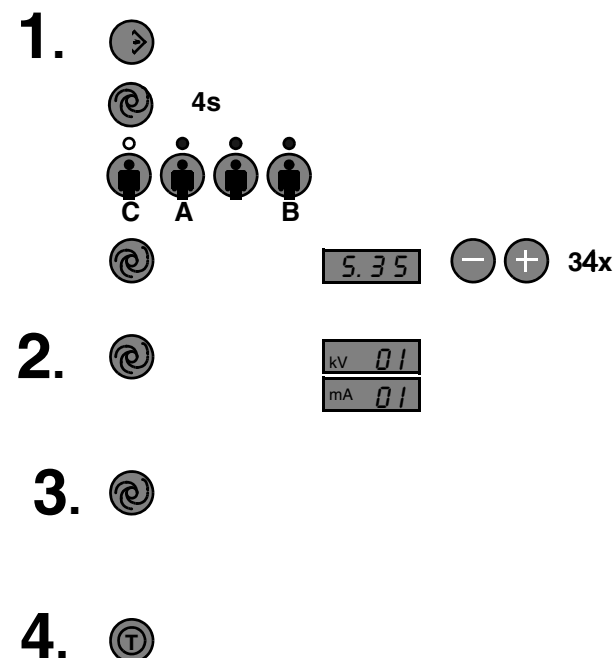
In the ma indication of the Multitimer 00 is displayed

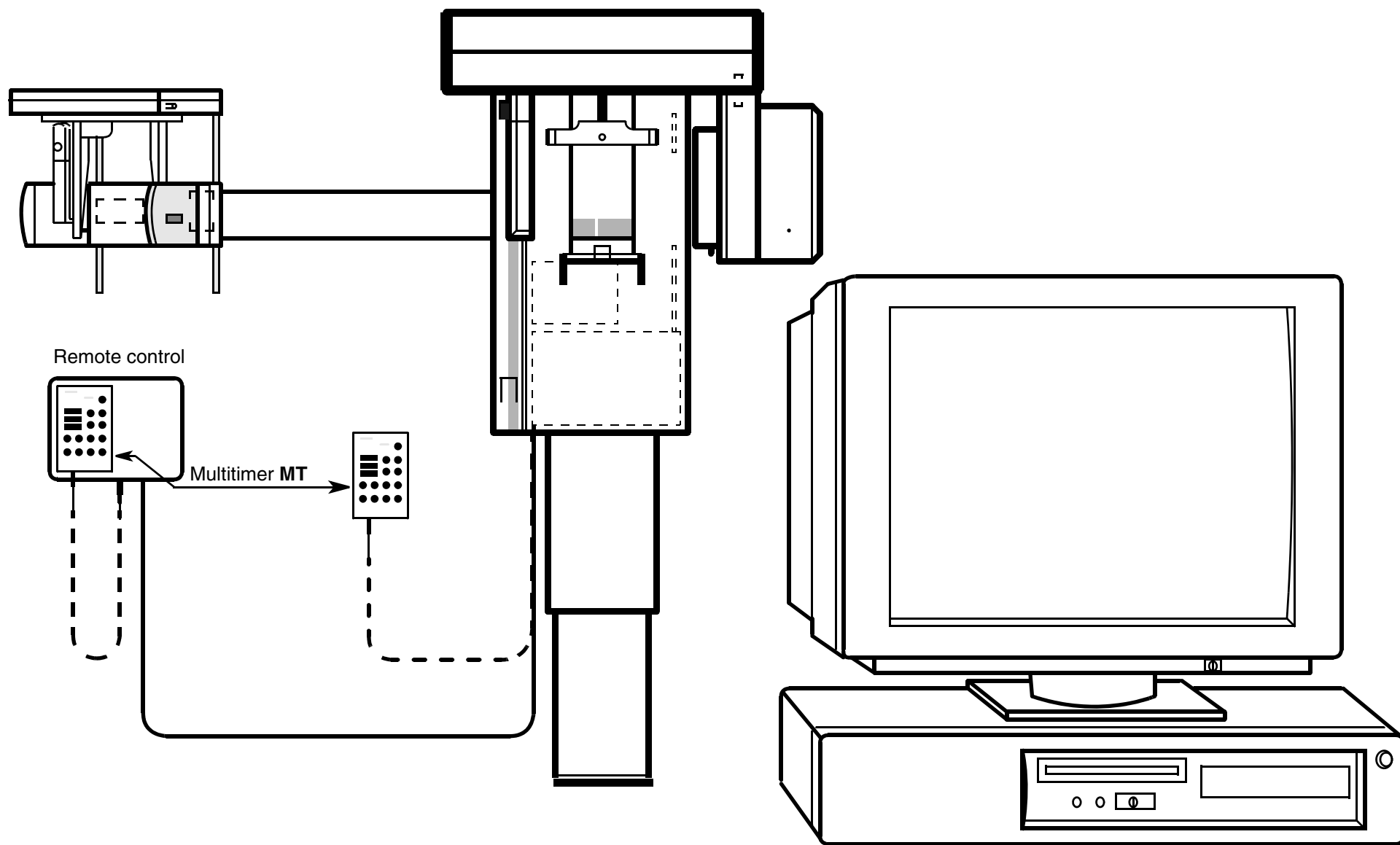
4. Actuate the test sequence button on the Multitimer to set the Active signal.

The ma indication changes to 11.

After setting the Active signal Service routines S.01, S.02, S.03, S.04, S.05 and S.36 can be run without first selecting "Constancy check/Factory service" on the SIDEXIS PC.




You can also reset the Active signal in the same way with this test step (switch mA indication back to 00 with Test sequence button). However, the Active signal is automatically reset when Factory service is selected on the SIDEXIS PC or the unit is switched off.

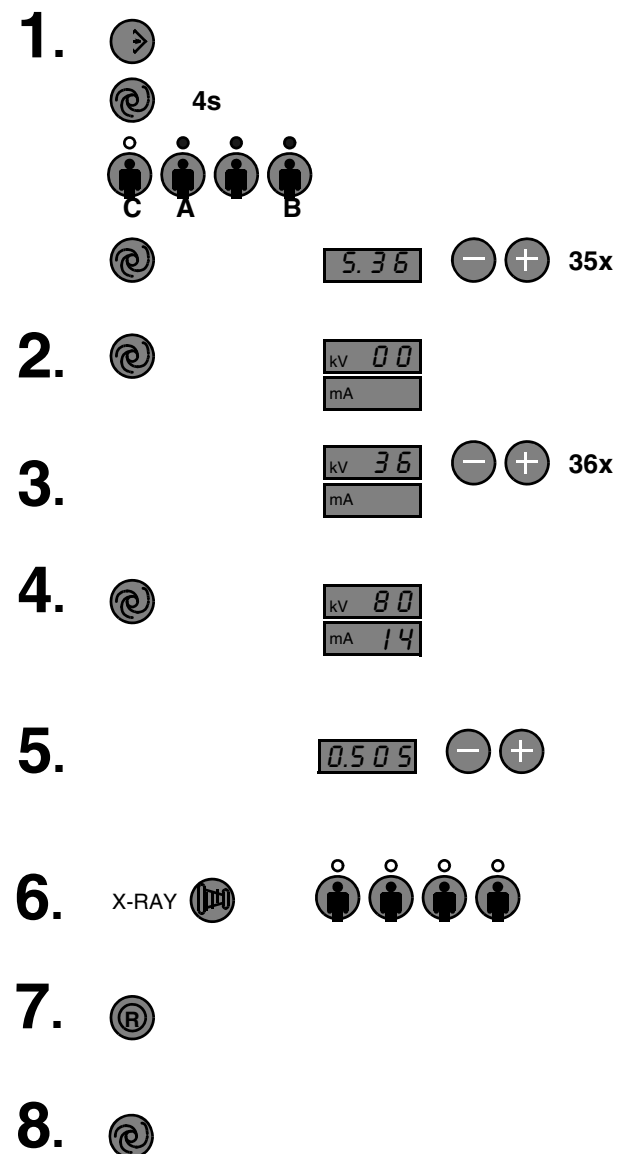






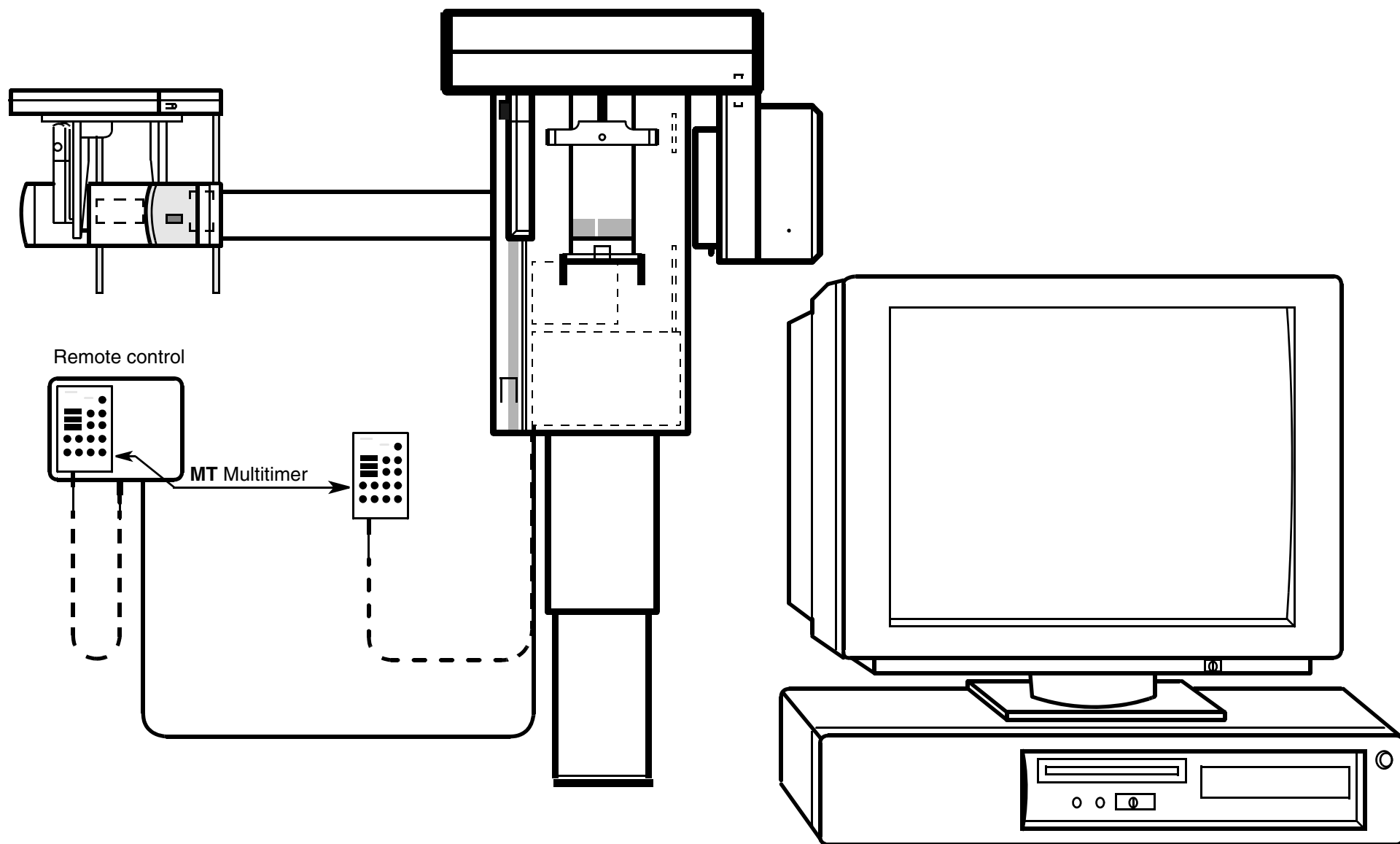
**ORTHOPHOS Plus DS only**

- **Service routine S.36 is required for checking the dose.**
  - Set readiness for exposure as described in section '**Setting exposure readiness on the PC**'. Select **Factory service (2)** or **set the Active signal internally with Service Routine S.35, test step 02.**
1. Select Service routine **S.36** as described in section "**Selecting service routines**".
  2. Briefly press the service key .  
The kV display indicates **00**.
  3. Enter service code 36 with the + key.
  4. Briefly press the service key .  
The kV/mA display indicates the kV/mA step 80/14.
  5. Use the program/radiation time +/- keys to set the radiation time setpoint to 0.50 sec.
  6. Press the X-ray button.  
**RADIATION** is generated for the duration of the set radiation time.  
During the radiation time the kV/mA display flashes and the 4 patient symbol LEDs light up.
  7. Press the R key.
  8. Briefly press the service key .





**5.28 Service routine S.36 Acceptance test dose measurement**


from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



**For ORTHOPHOS Plus DS only:**

- **Service routine S.37 is required to call up and delete the IP address settings.**
1. Select service routine **S.37** as described in the chapter 'Selecting a service routine'.
  2. Press the  service key briefly.  
The kV display reads **00**.
  3. Enter service code **37** with the + key.  
The kV display then reads **37**.
  4. Press the  service key briefly.  
Test step 01 appears on the mA display.  
Select the required test step with the kV +/- keys.

**Test step 01: Address displays**

5. Press the  service key briefly.  
On the program/radiation time display the first 3-digit block of the IP address appears and the 1-LED patient symbol lights up.  
The kV display reads **01**.

The addresses can be read out as follows:

Select the address with kV +/- keys and the kV display.


01 = IP address

02 = Standard gateway

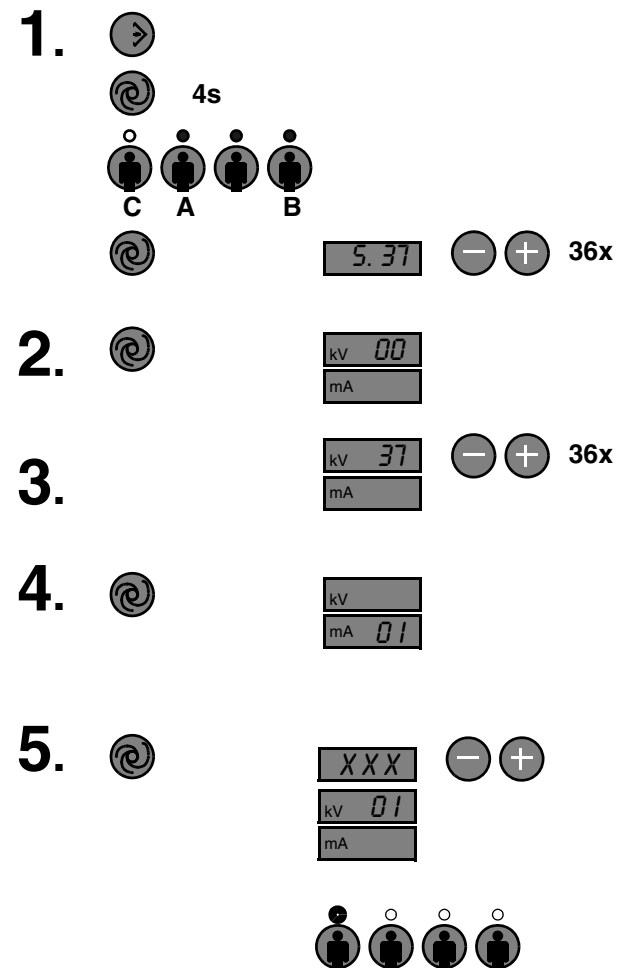
03 = Subnet mask

Use the patient symbol keys to switch to the next address block.

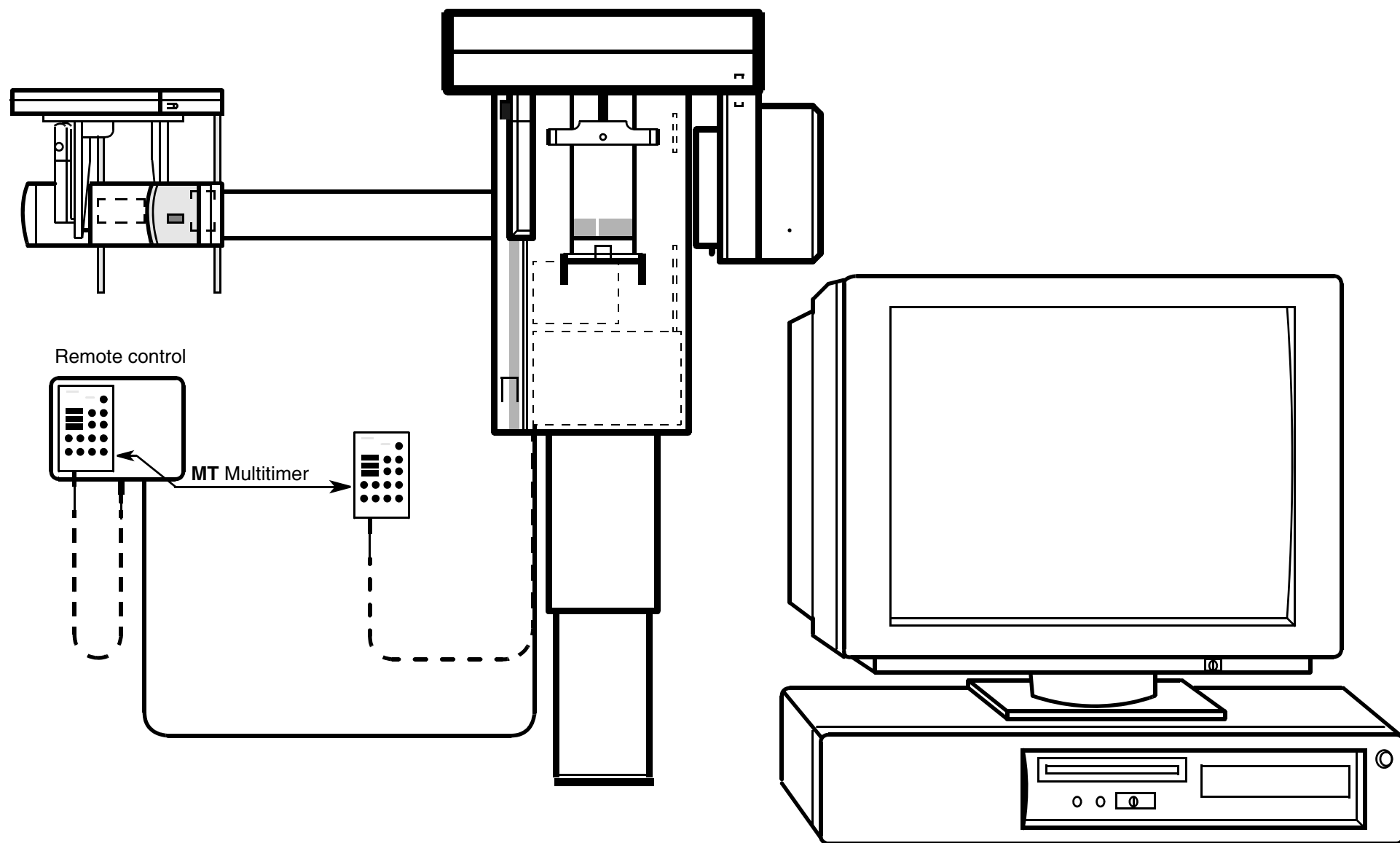
Syntax "xxx . xxx . xxx . xxx" (Led 1, Led 2, Led 3, Led 4).

**Note:** If the system concerned is an XOP system or the XAB system is not recognized, the kV/ mA display will be set to "EE/EE" after the test step is selected with the  service key.  
If no communication takes place, error message E4 10 will be displayed.




continued on next page



from serial no. 2 000 ORTHOPHOS Plus DS  
52 000 ORTHOPHOS Plus DS Ceph



**Test step 02:** Deleting the IP addresses  
This test step is required to reset the X-ray component to the factory setting

6. Press the  service key briefly.  
The kV/mA display reads **FF FF**.  
The LED above the Memory key flashes.
  7. Press the Memory key.  
The LED above the R key flashes.
  8. Press the R return key.  
The addresses of the XAB system are deleted.  
The kV/mA display reads **00 00**.
  9. Press the  service key briefly.
  10. Switch the unit off, wait for at least 60s and then switch it back on.
- If the **"Configuration of X-ray Components"** (SIXABCON) program and the **"New Component"** field are selected on the PC, error message E4 21 (the XAB system is in "Boot Service") will appear following the self-adjustment procedure. The unit is ready to receive new addresses.
  - If the **"New Component"** dialog is **not** selected on the PC, the XAB system will automatically set its internal default addresses after 10s have elapsed at the latest, and can be detected under these addresses until the next time it is switched off.
- Note:** If the system concerned is an XOP system or the XAB system is not recognized, the kV/ mA display will be set to "EE/EE" after the test step is selected with the  service key.  
If no communication takes place, error message E4 10 will be displayed.



| Default address setting of networked Orthophos |                  |                |
|------------------------------------------------|------------------|----------------|
| 01                                             | IP address       | 192.168.15.200 |
| 02                                             | Standard gateway | 192.168.15.1   |
| 03                                             | Subnet mask      | 255.255.255.0  |



## 6 Repairs

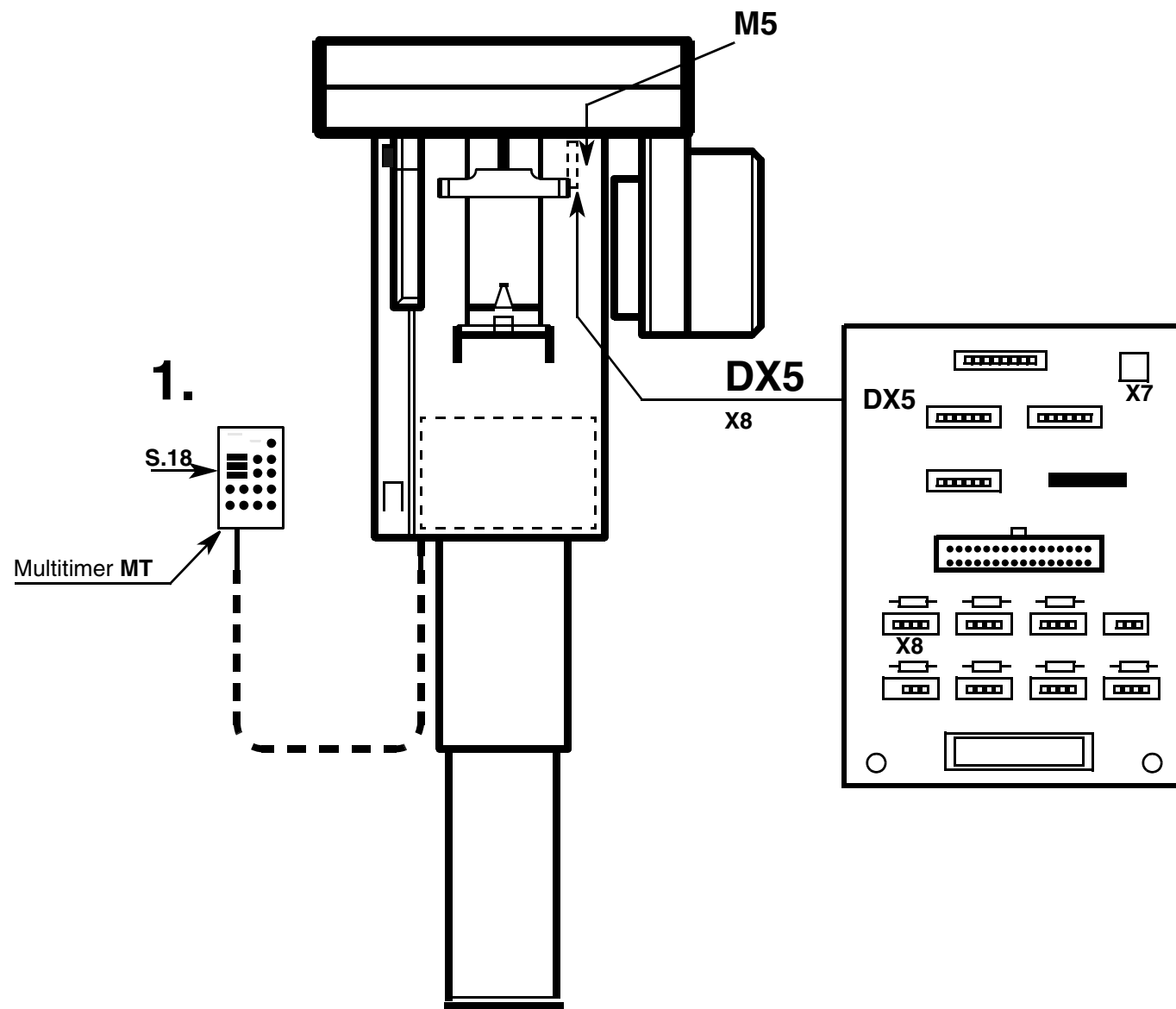
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2.4 m  
min.

**Loaned tool 14 49 672 is required:**

This consists of the dismantling tool with guided tube and loaned gas-operated spring.

**ATTENTION: Mind the minimum room height!**

In a room lower than **2.4 m min.** the unit must be unscrewed from the wall and the floor according to step 3 and must be held in an inclined position.

**1. Adjusting motor M5 to maximum power**

- Turn the unit ON.
- Select Service routine **S.18**, test step **03**.
- The Multitimer indicates **S.18**.
- Use program + key to set the value to 400.
- The current **height** is shown on the height adjustment display.
- Move the unit to a height of 630 with the HV keys ↑.
- Unplug connector X8 on board DX5 (interrupts the pulses for height adjustment).

**2. Using the dismantling tool and the loaned gas-operated spring**

If the hole Z does not exist, unscrew the rear panel X.

Pull the bonded cover Y from the base plate.

Insert the dismantling tool into the support tube Z.

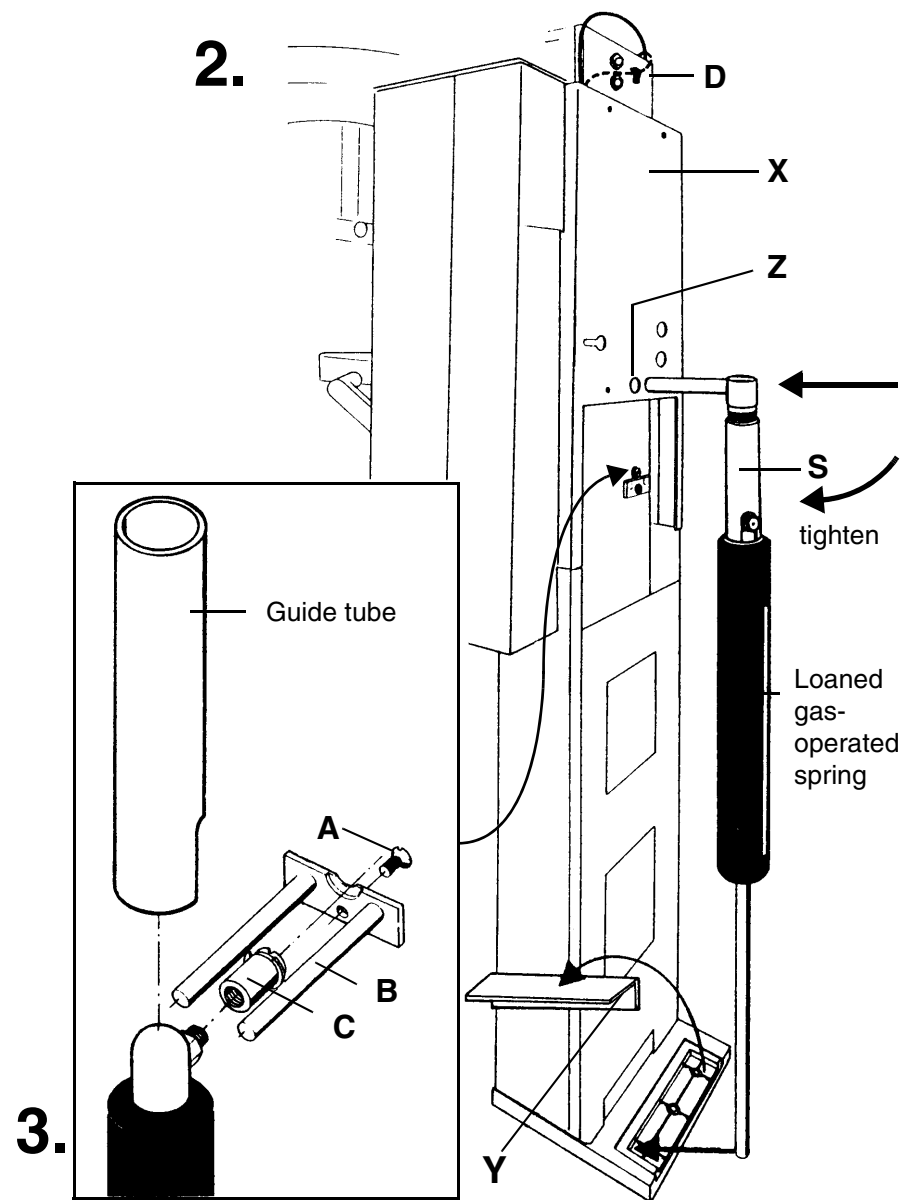
Fit the loaned gas-operated spring into the dismantling tool and place its lower end into the corner of the base plate.

Turn sleeve S of the dismantling tool until the loaned gas-operated spring is under a light load.

Move the unit to the maximum height:

Simultaneously tighten sleeve S (approx. 5 turns = 10 to 15 mm) and press the ↑ key for height adjustment, until the gas-operated spring is no longer loaded (it is slack).

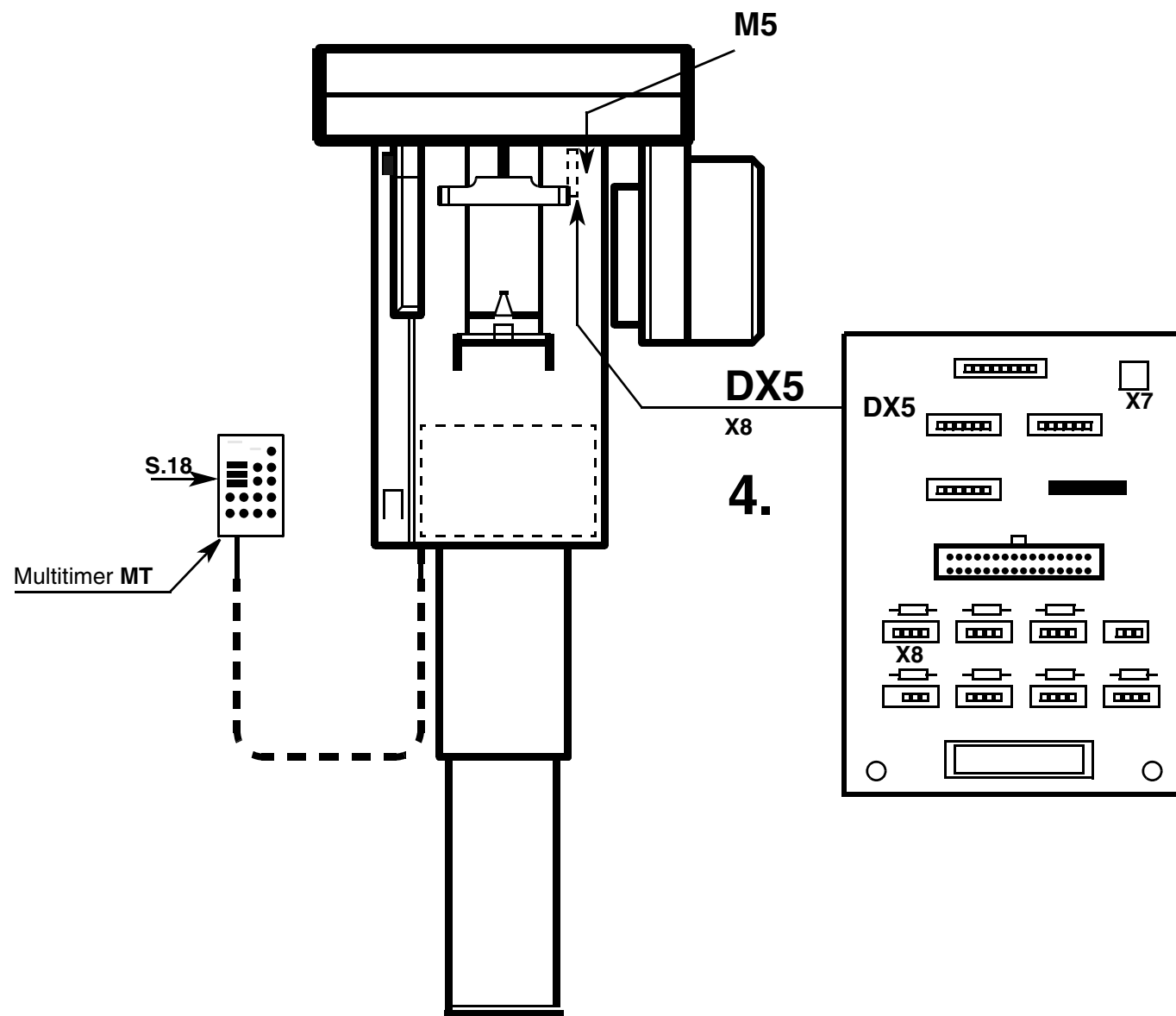
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## 6.1 Replacing the gas-operated spring

6 - 6

2.4 m  
min.



**Continued**

**3. Replacing the gas-operated spring**

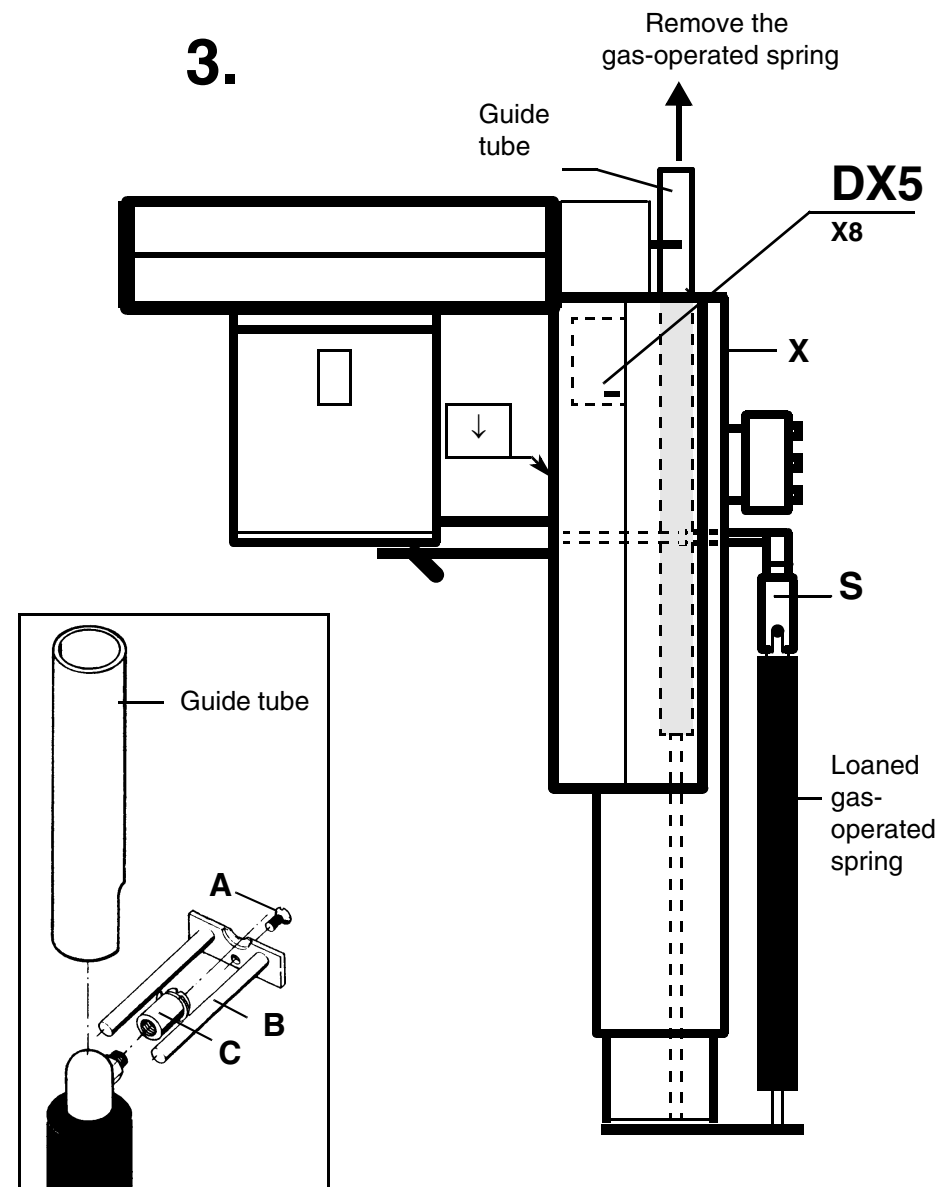
Take out screw A from fork B on the rear of the unit.  
Pull fork B towards the rear and out of the column.  
Unscrew sleeve C with the retaining ring from the gas-operated spring.  
Unscrew cable clamp D and make the cable accessible.  
Fit the guide tube of the loaned tool onto the gas-operated spring.  
Drive the unit down ↓ to its minimum height.  
Remove the guide tube and the gas-operated spring.  
Fit the new gas-operated spring. Place the rod in the recess in the column base.  
Drive the unit upward ↑ to its maximum height  
Screw in the sleeve C and tighten it. The retaining ring must be in place!  
Insert fork B and secure it with screw A.

**4. Final measures**

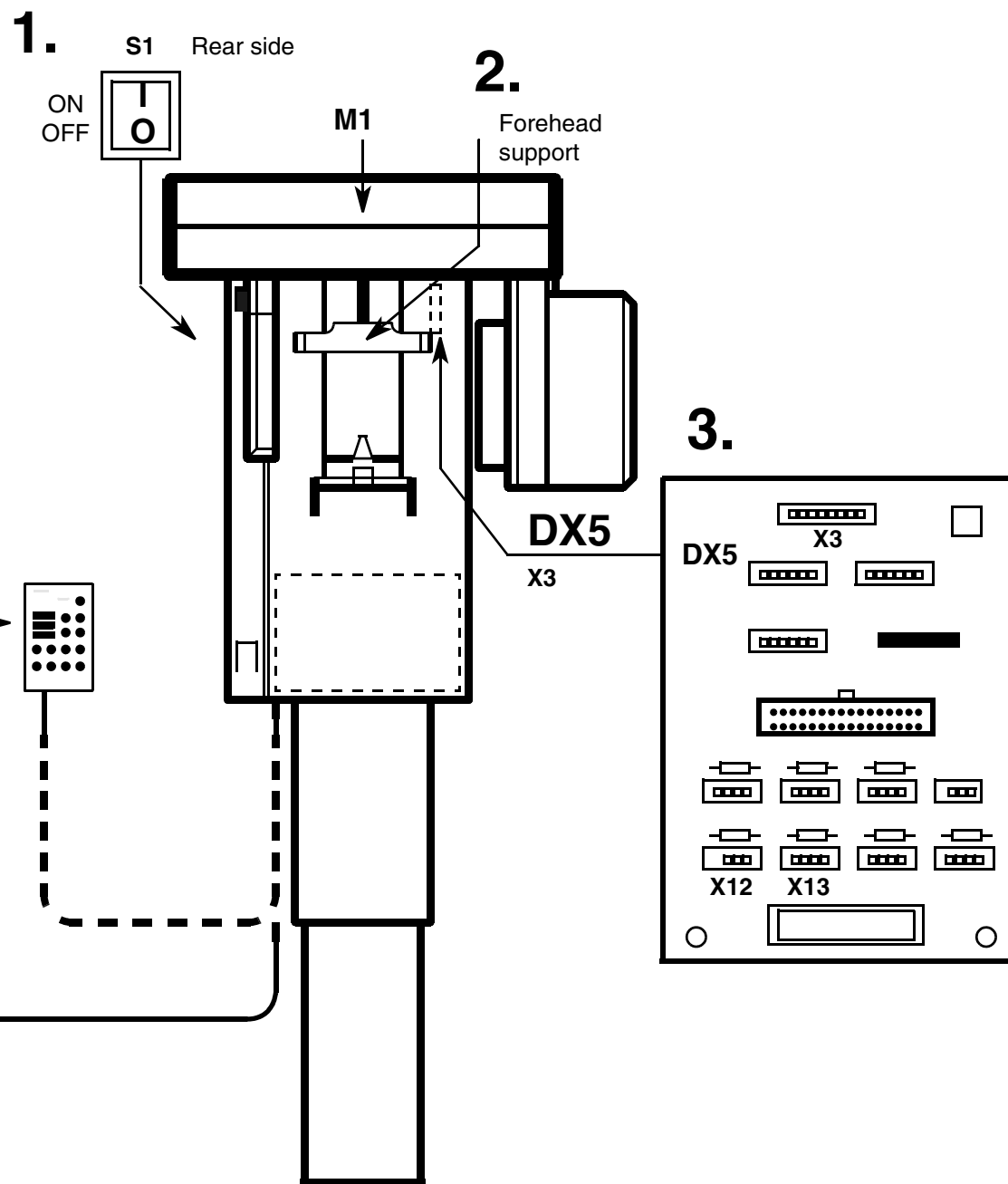
Press the ↓ key for height adjustment and simultaneously loosen sleeve S (about 5 turns) until the load is removed from the loaned gas-operated spring.  
Take away the loaned gas-operated spring and the dismantling tool.  
Plug connector X8 back to board DX5.  
Secure the cable with cable clamp D.

**Perform Service routine S.18,**  see page 5 - 51.

Reattach the panels.



## 6.1 Replacing the gas-operated spring

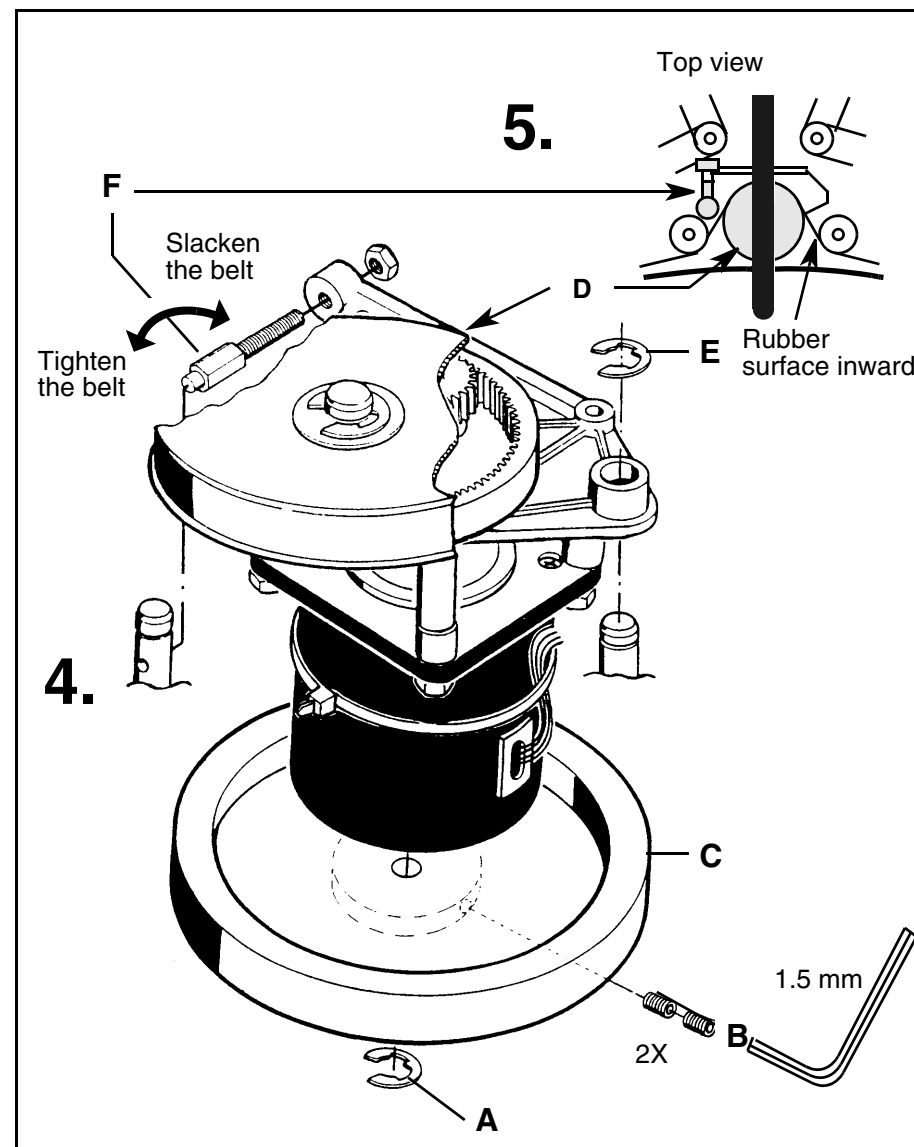


**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

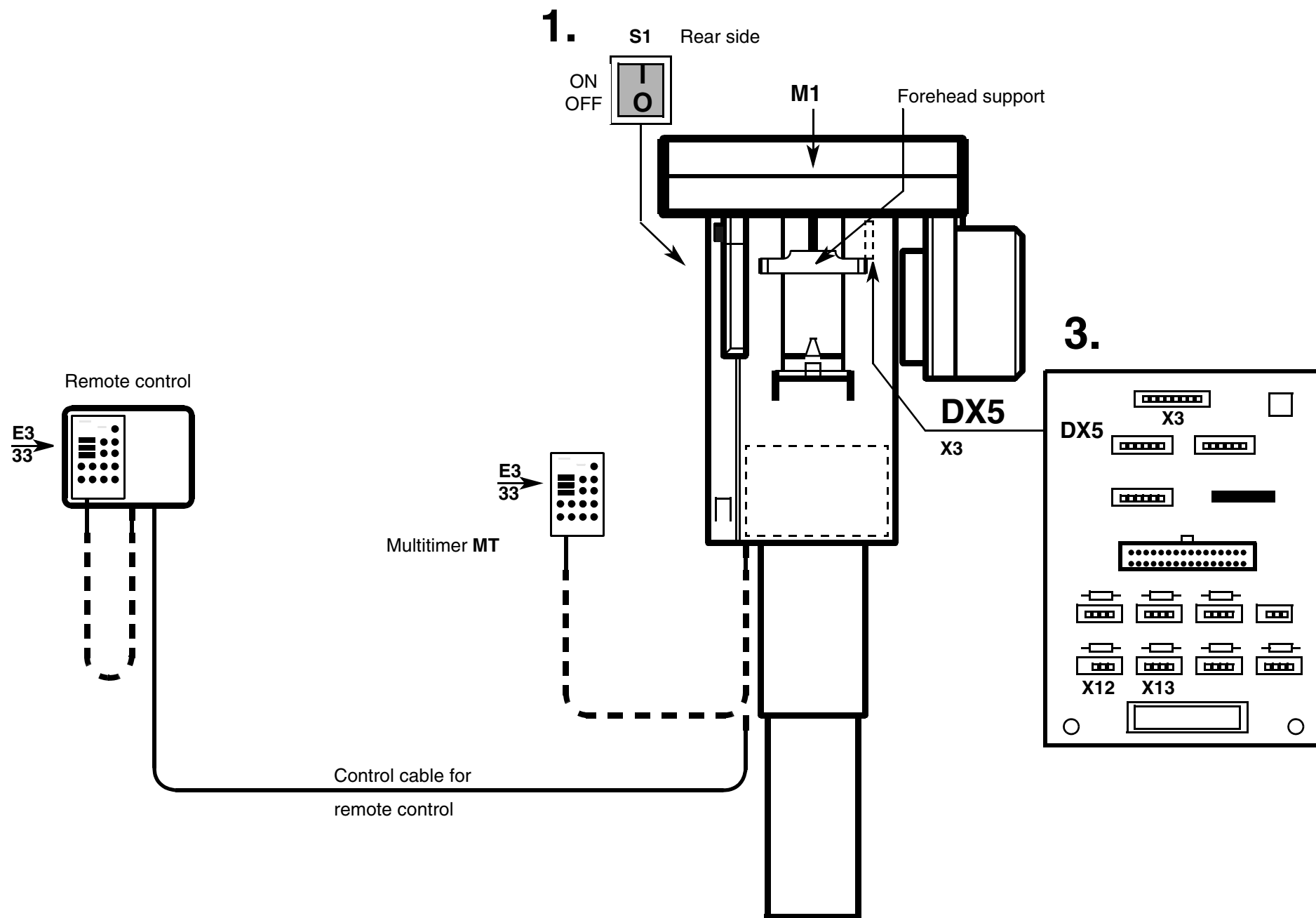
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- Turn the unit ON.
- 1. Move the unit to the installation position:
  - Select Service routine **S.19**, test step **03**.
  - Move the X-ray tube assembly to the replacement position.
  - Turn the unit OFF.
- 2. Remove the forehead support.  
See section '**Replacing the forehead support and/or the forehead support motor**'.
- 3. Unplug connector X3 on board DX5.
- 4. Replace motor M1:
  - Pull off retaining ring **A**.
  - Loosen threaded pins **B**.
  - Take away the counterweight disk **C** from below after lowering it.
  - Turn the belt tension bolt **F** until the belt slackens.
  - Remove the flat belt from the pulley **D** (place the rubber surface inward and the adhesion point over the X-ray tube assembly).
  - Pull off retaining ring **E**.
  - Lift off the complete motor M1.
  - Mount the new motor. Fit the counterweight disk and secure it with both threaded pins **B**.
- 5. Adjust the flat belt:
  - Switch the unit ON.
  - Turn the X-ray tube assembly manually to the rotation mid-point.
  - Hold the X-ray tube unit with your hand and press the **R** key on the Multitimer. Turn (tighten) the belt tension bolt **F** until the belt no longer slips.

Continued on next page



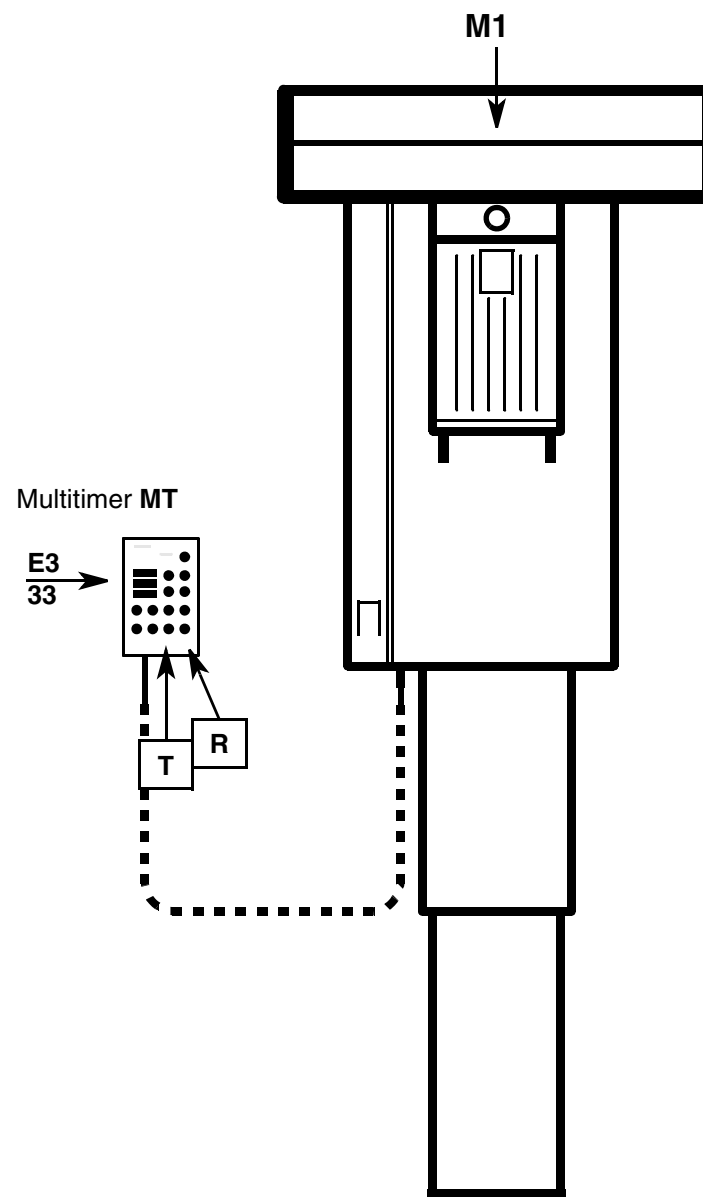
## 6.2 Replacing the rotation motor M1





**Continued**

- **If error message E3 33 appears:**
- Press the R key on the Multitimer.
- Error indication **E3 33** turns off.
- Press the R key on the Multitimer and continue the belt tensioning process.
- **Carry out a test rotation:**
- Turn the X-ray tube assembly manually to the rotation start position.
- Press the T key on the Multitimer.
- The test run should be smooth and with uniform speed (repeat the test rotation 3 - 4 times).
- Secure the belt positioning bolt F with the lock nut.
- Adjust the forehead support according to section '**Replacing the forehead support and/or the forehead support motor M6**'  
☞ see page 6 - 17.
- Assemble the unit completely.
- Final check:  
Make a phantom exposure according to section '**Phantom exposure**', item 4, ☞ see page 4 - 5.



## 6.2 Replacing the rotation motor M1

1.

S1 Rear side

ON  
OFF

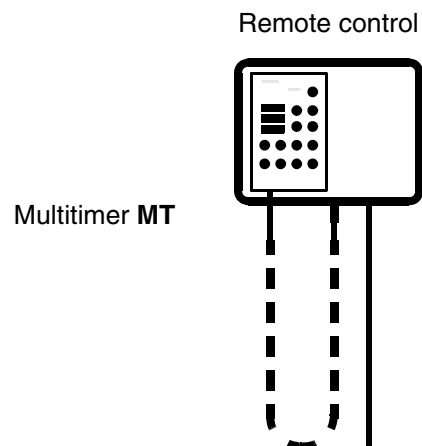
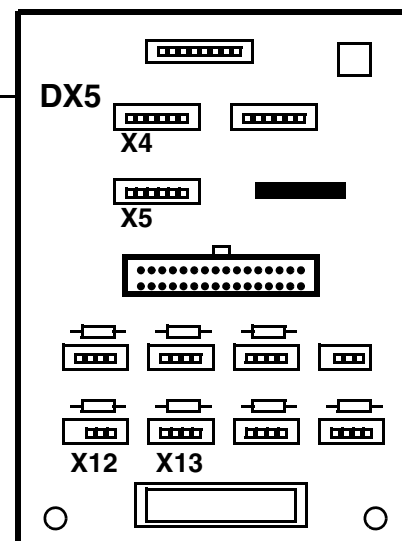
M3

M2

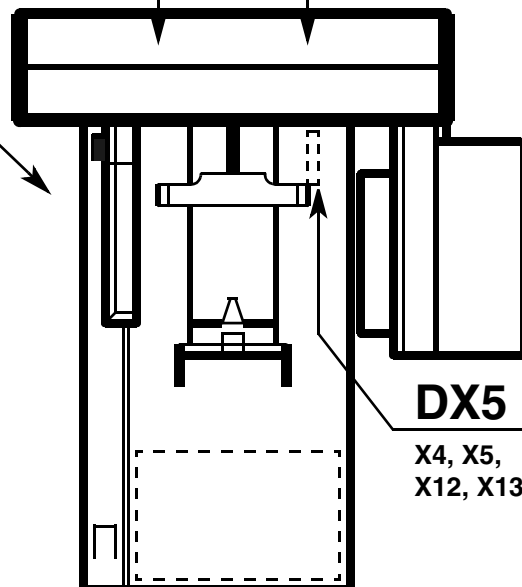
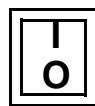
DX5

X4, X5,  
X12, X13

2.



Multimer MT

Control cable for  
remote control

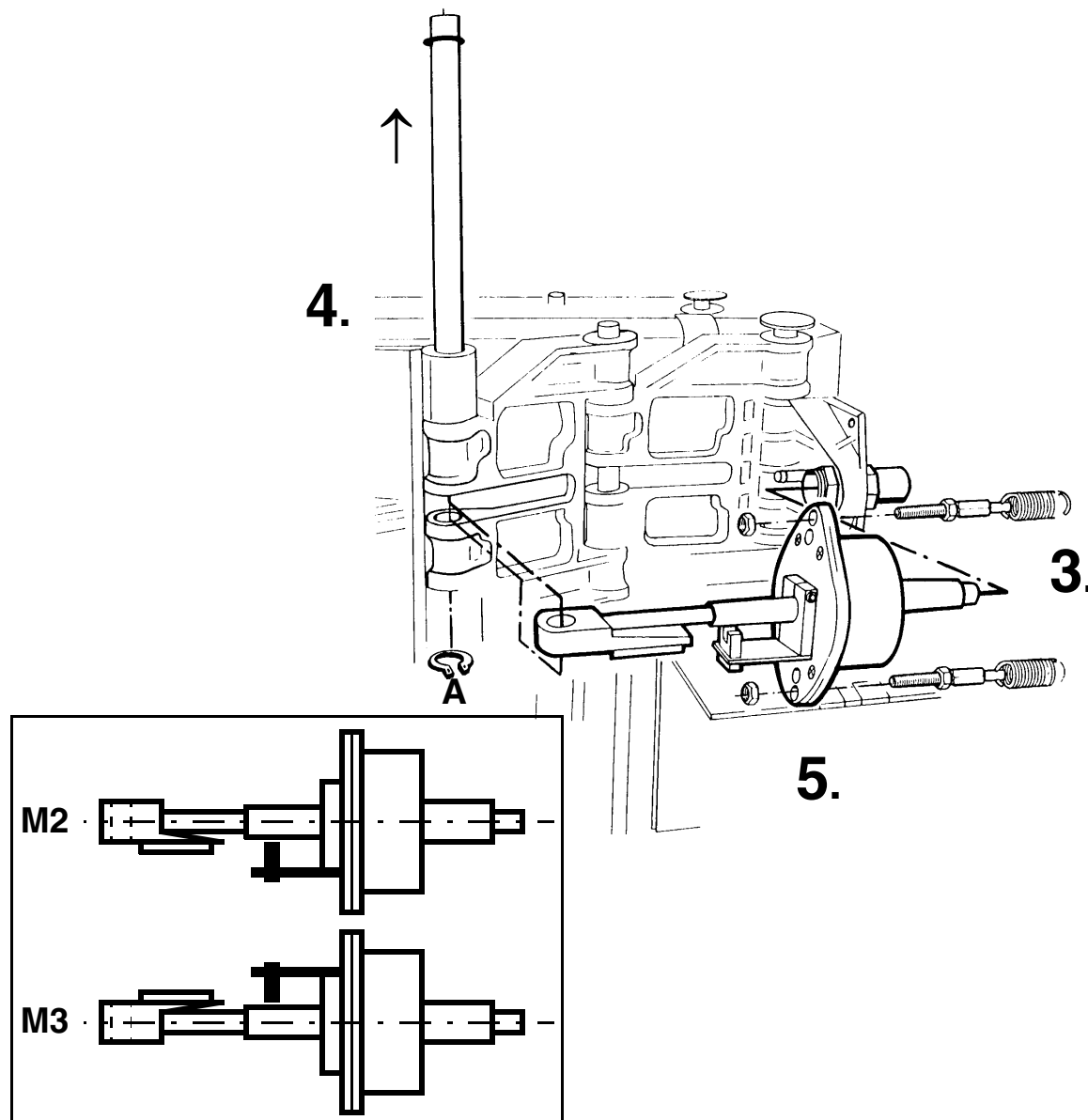
**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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D 3297.077.01.10.02 04.2007

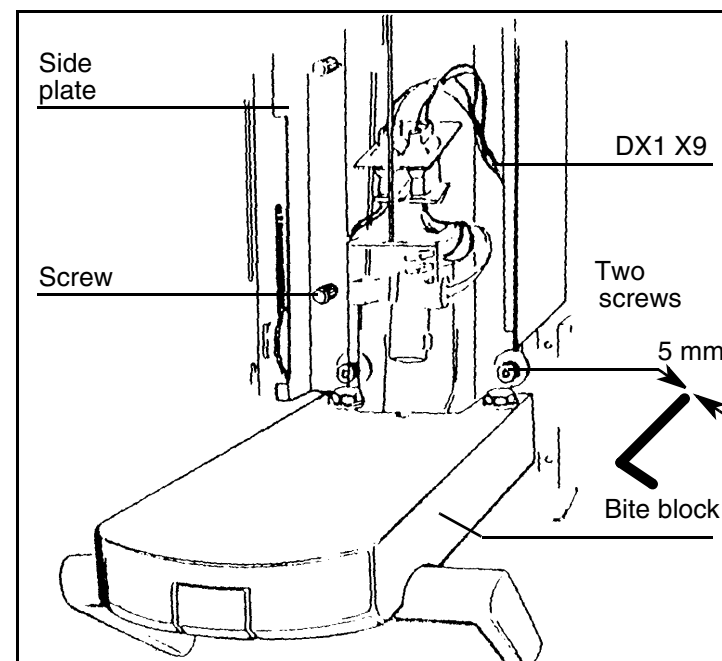
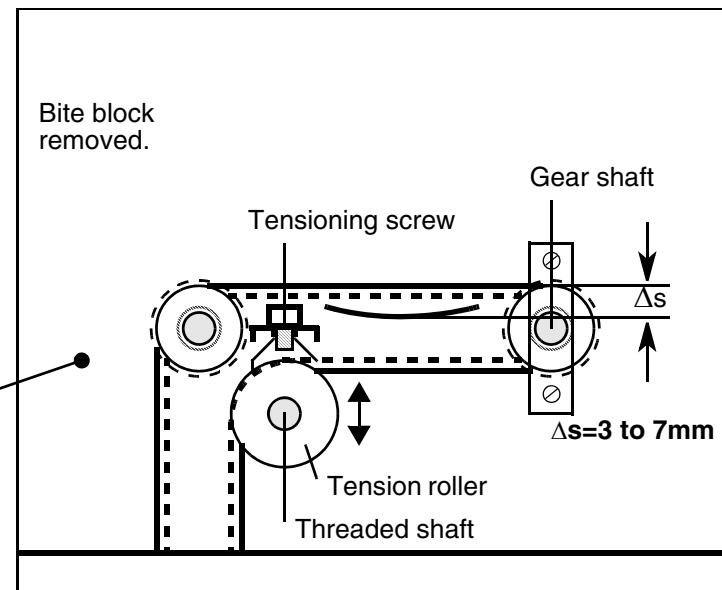
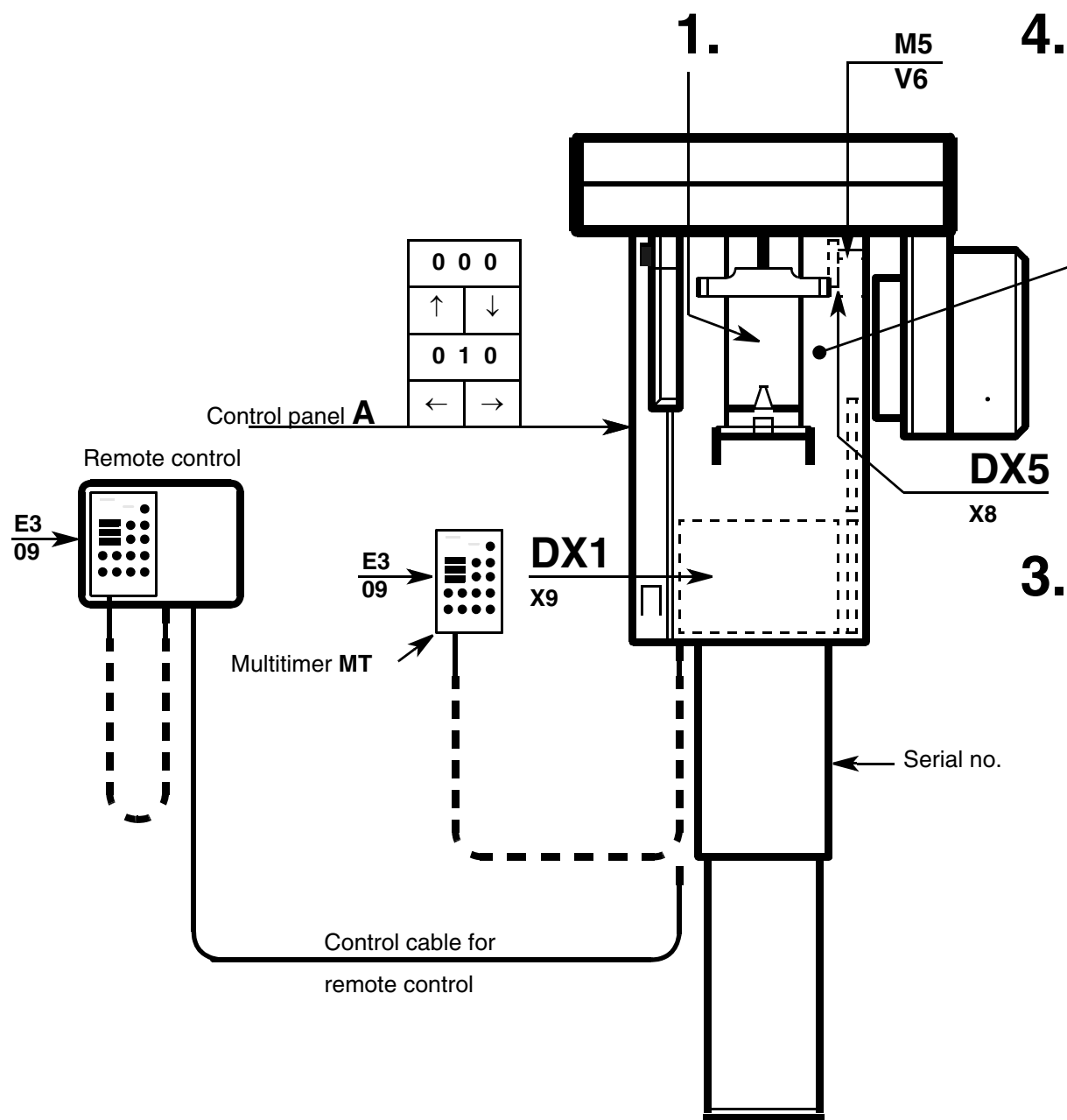
1. Turn the unit ON.

**The actuators are always in the symmetry position.**

2. Unplug the connectors on board DX5 for actuator M2 (X4, X12) or for actuator M3 (X5, X13).
  3. Loosen the screws and nuts  
Take out the tension springs.
  4. Pull the retaining ring A off the shaft.  
Pull the shaft out of the support arm.
  5. Remove the actuator.
- Install the new actuator.  
ATTENTION: Observe the correct position of the actuators!
  - Adjust the actuators.  
Proceed according to section 'Phantom exposure', see page 4 - 5.



## 6.3 Replacing the actuators M2/M3



**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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- Remove the panels.
- 1. Take out the inserted mirror.
- 2. Unplug connector X9 on board DX1 and open the cable tie.
- 3. Loosen two screws and remove the side plate.  
Pull off the bite block after taking out the screws.
- Drive the unit downward ↓, **until the red transport safety screw on the rear side of the unit can be inserted!** (should be included in the "Adjusting kit"; see Installation Instructions).
- 4. Screw the threaded shaft of the tension roller back one turn.  
Slacken the belt with the tension screw.
- 5. Pull the retaining ring and the toothed roller from the gear shaft.  
Take the disk spring from the gear shaft.
- 5.1 Unplug connectors X8, X15 from board DX5.
- 6. Unscrew motor M5 and replace it.

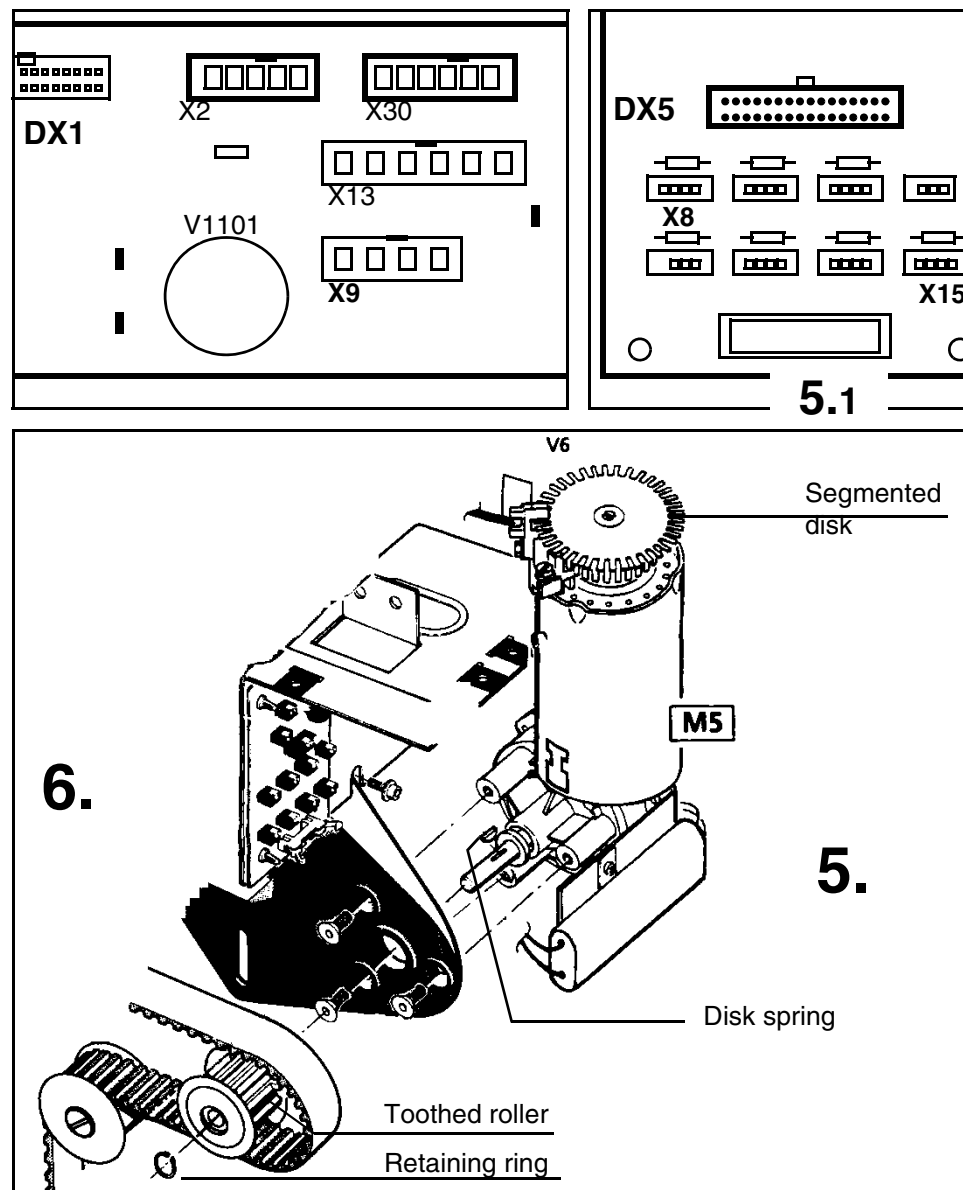
- Assemble the unit completely.

Important: Connector X9 on board DX1  
(see section 'Adjusting board DX1', see page 4 - 39)!

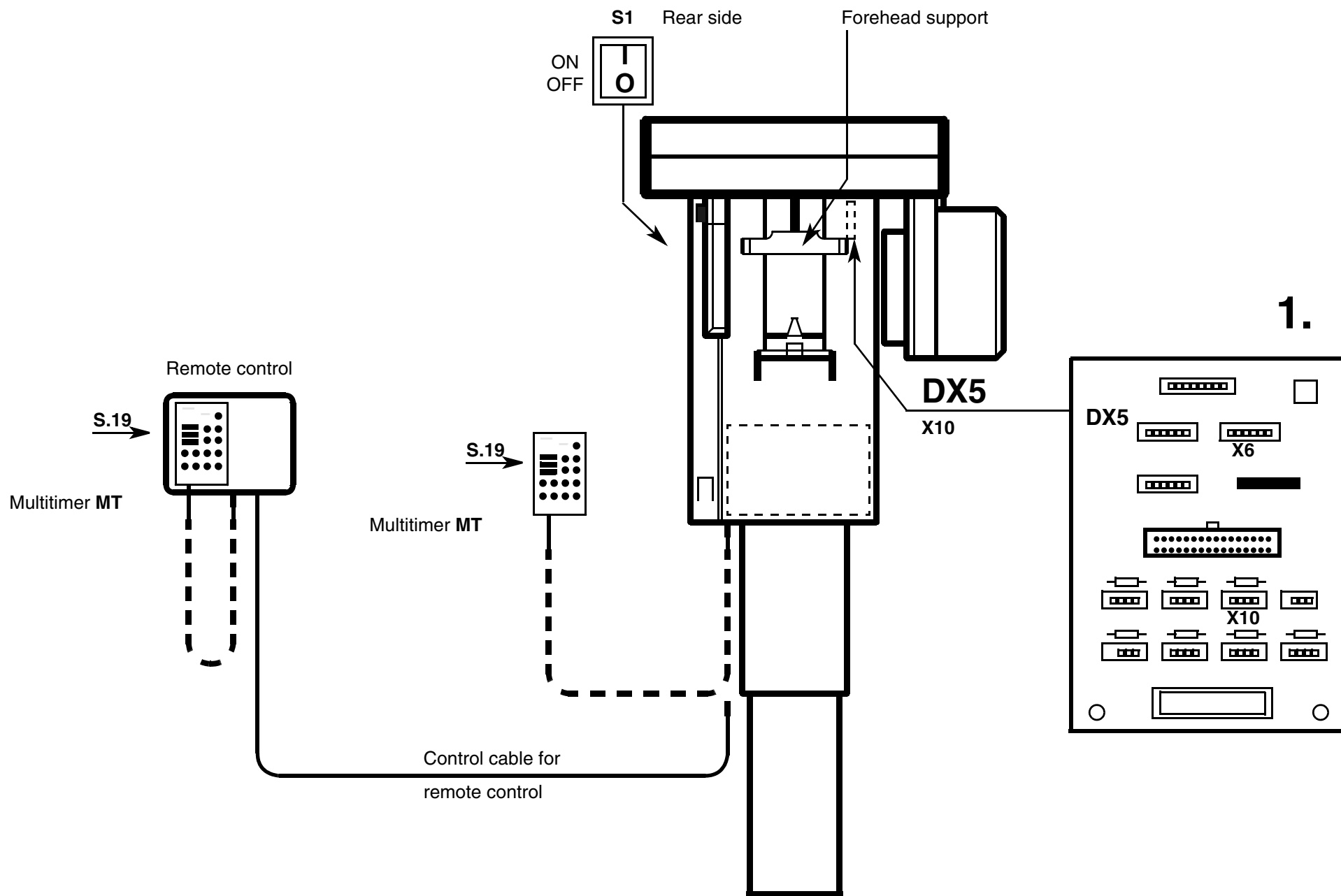
Retighten the threaded shaft of the tension roller!



Align the bite block with a spirit level!

- Take out the transport safety screw.  
Perform Service routine **S.18**, see page 5 - 51.



## 6.4 Replacing the height adjustment motor M5



- **Select Service routine S.19.**
- **Test step 03:** Drive the unit to the installation position
- Briefly press the service key . The mA display indicates **00**. The LED above the R key flashes.
- Press the Return key R (LED stops flashing). Move the actuators M2 and M3 forward for 23 mm.
- P02 is indicated on the lateral control panel. The LED above the service key  lights up.

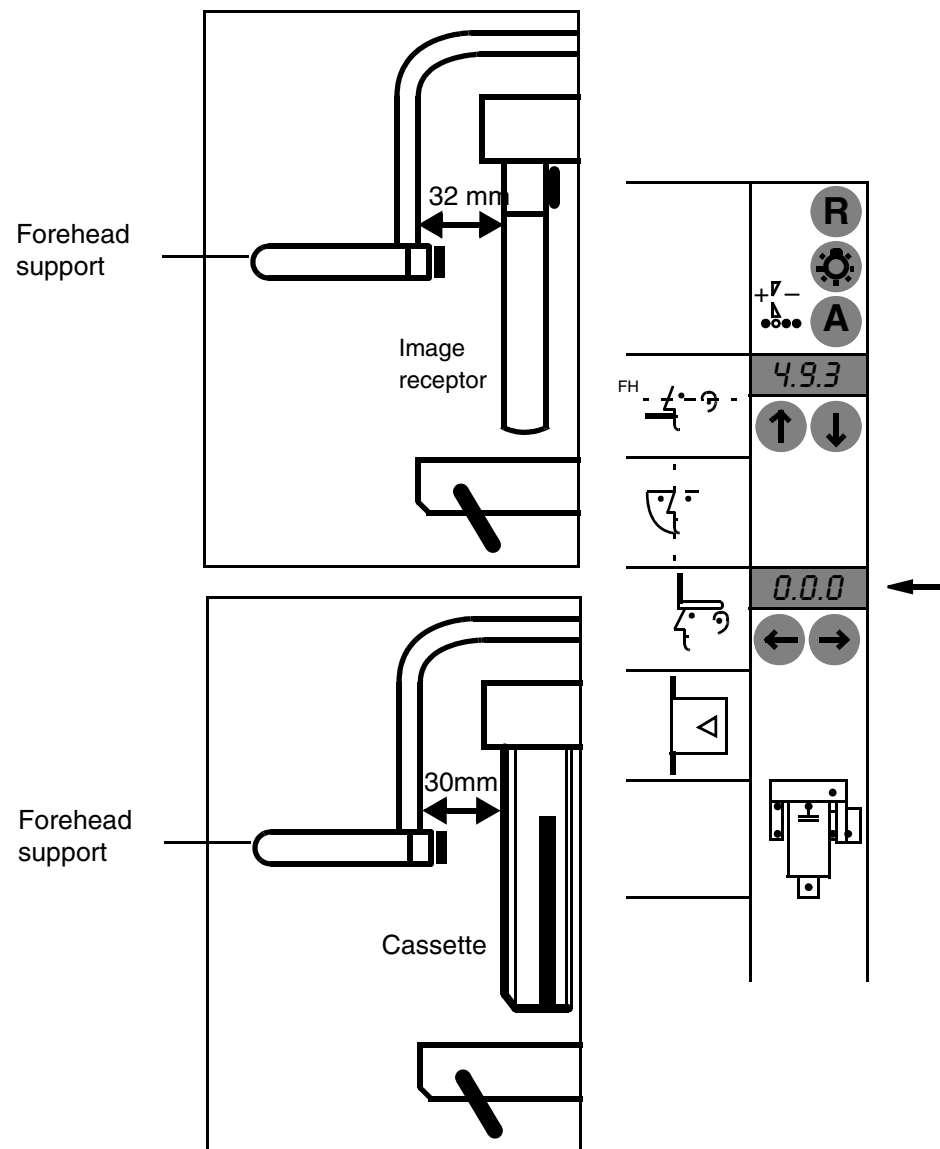
#### Replacing the forehead support:

1. Unplug connector X10 on board DX5.  
Remove nut A and washer.
2. Loosen screw B (see next page).  
Pull out the forehead support.
- 2.1 Insert the new forehead support and secure it with nut A.  
Plug connector 10 back to board DX5.

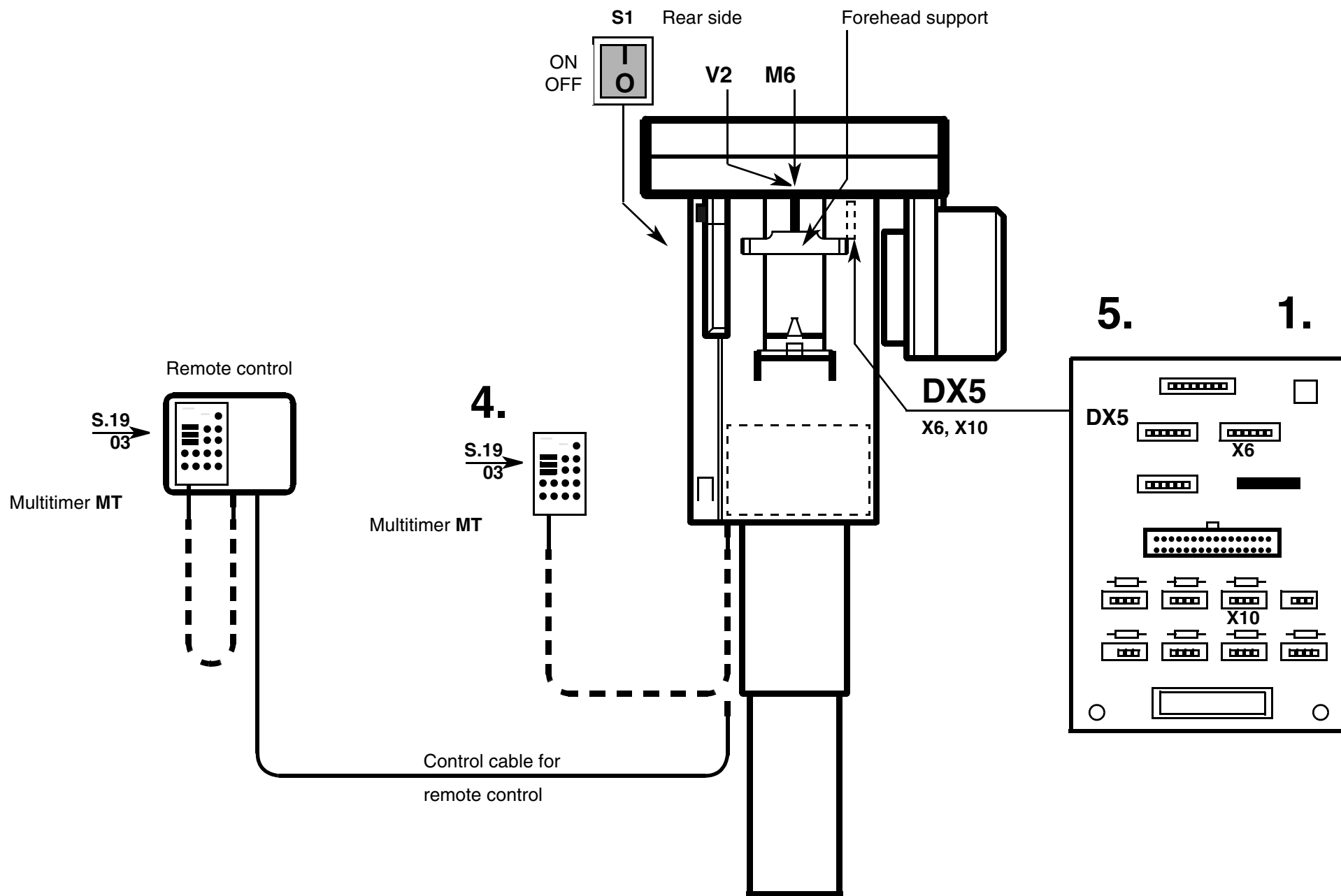
#### Adjusting the forehead support:

- Rotate the X-ray tube assembly to the 180° position.
  - Adjust for a clearance of 32 mm between the vertical tube section and the image receptor or 30mm between the vertical tube section and the cassette holder.
  - Position the spirit level on the side of the forehead support tube (see next page) and carry out the alignment.
  - Tighten screw B and assemble the unit completely.
3. Perform Service routine **S.19**, test step 1.  
Perform Service routine **S.20**, test step 2.

Continued on next page



## 6.5 Replacing the forehead support and/or the forehead support motor M6

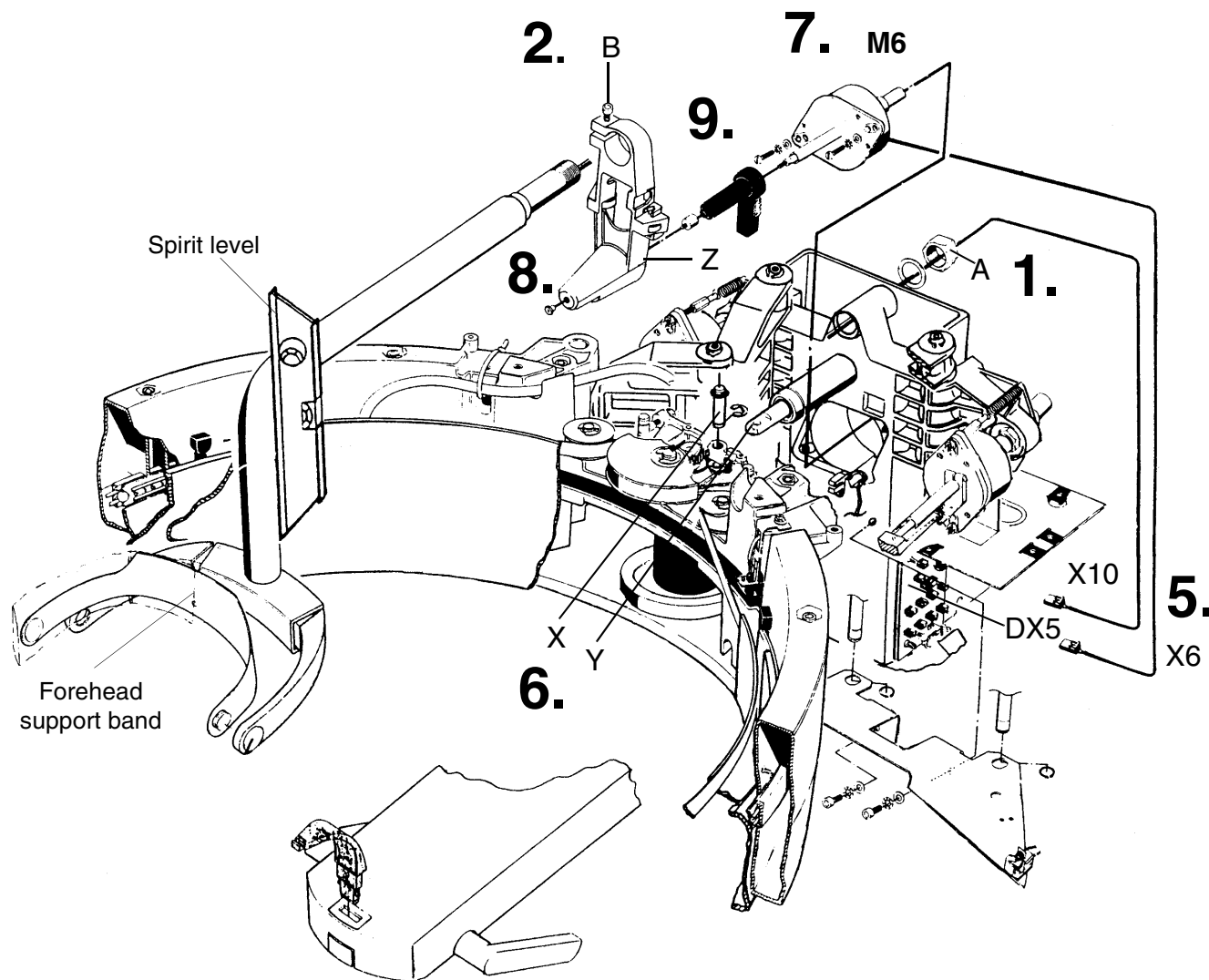




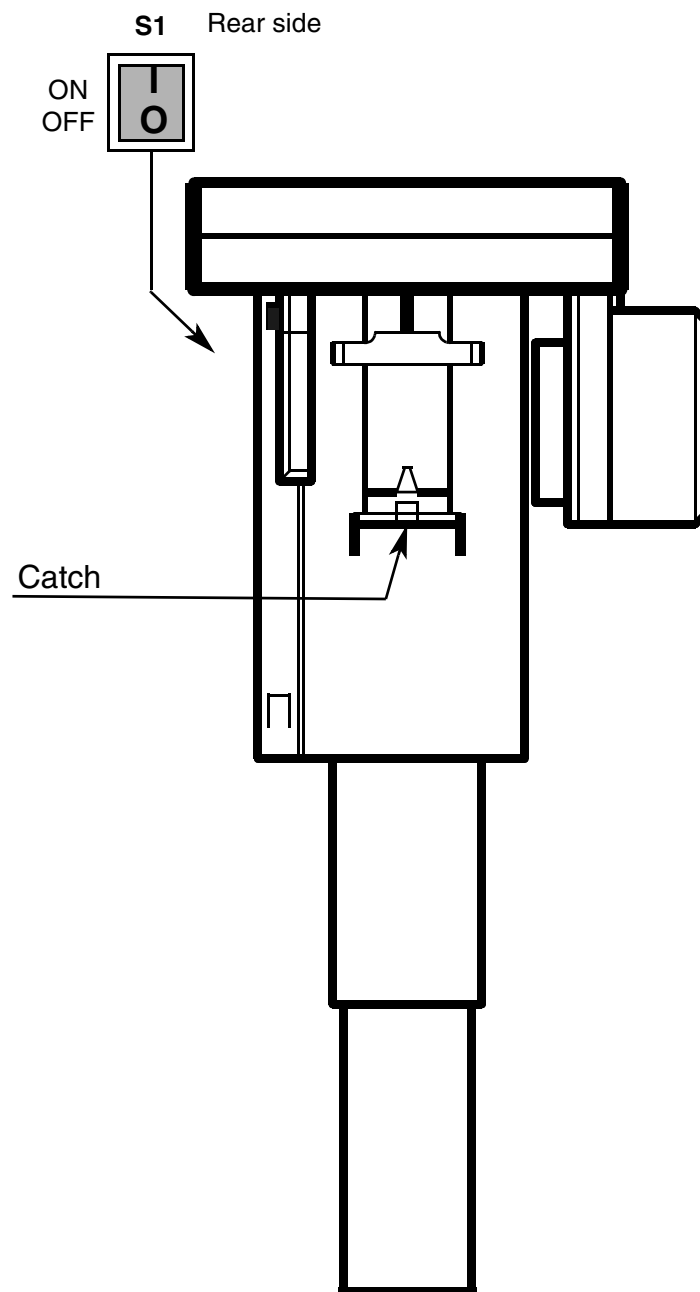
**Continued**

**Replacing the forehead support motor M6:**

4. Turn the unit ON.
  - Select Service routine **S.19**, test step **3** (see previous page).
  - Proceed according to steps **1.** and **2.**
5. Unplug connector **X6** and **X10** on board **DX5**.
6. Pull off the lower retaining ring **X**. Push out the pin. Insert guide **Y** into the guide tube.
7. Take out the two screws. Remove the motor **M6** with drive element **Z**.
8. Unscrew the nut and pull off the drive element.
9. Unscrew the bearing and remove the housing.
  - Take out motor **M6**.
  - Install the new motor **M6**.
  - Reinstall the forehead support according to steps **2.1 – 3.** and test it.
  - Use Loctite to secure the screws originally secured with Loctite.



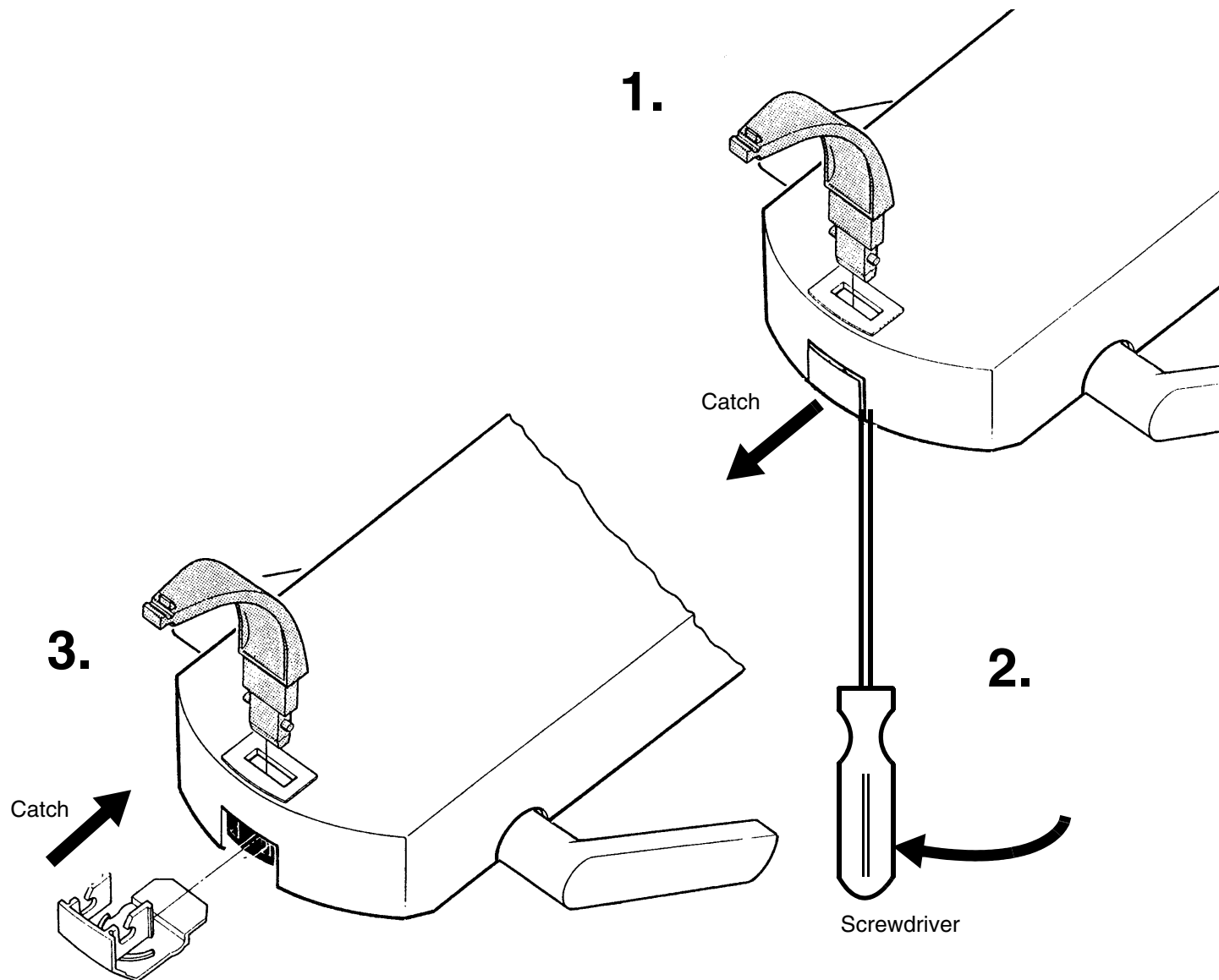
## 6.5 Replacing the forehead support and/or the forehead support motor M6



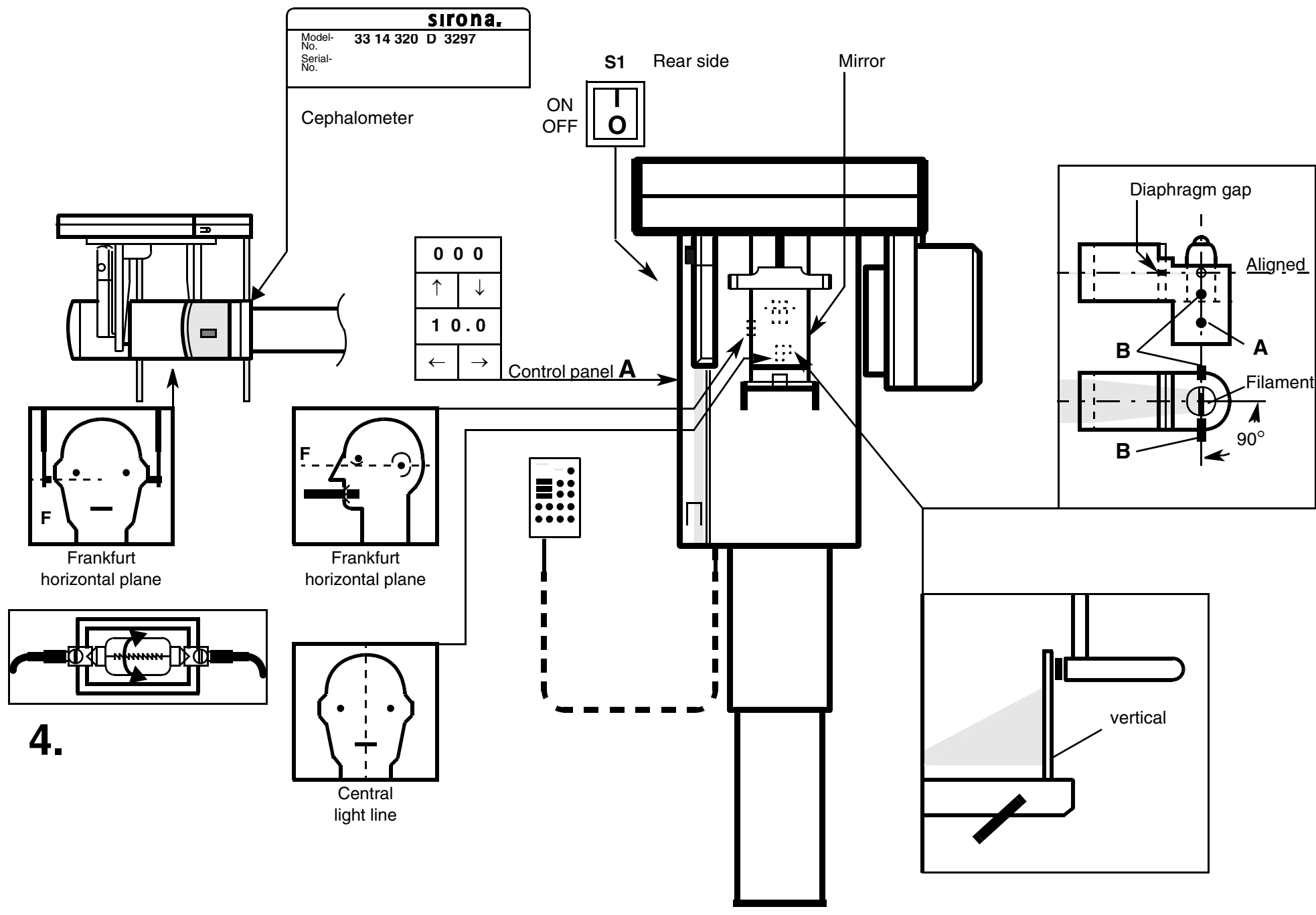
**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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1. Remove the bite block/support segment.
  2. Use a screwdriver to press the catch sideways and pull it out.
  3. Push the new catch in until it engages.
- Perform a functional check.



## 6.6 Replacing the catch for the bite block/support segment



**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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- Turn the unit OFF.

- Remove the mirror.

1. Unscrew the diaphragm and remove it.

2. Replacing the halogen lamp for the "Frankfurt horizontal plane":

Unplug connector K7.

Pull the light-beam localizer unit off both holders.

Pull out the lamp and replace it.

NOTE:

Do not touch the glass bulb of a new lamp with your fingers.

Wipe it clean with methyl alcohol .

- Check the orientation of the light line; see step 5.

3. Replacing the halogen lamp for the "Central light line":

Unplug connector K8.

Pull the light-beam localizer unit off both holders.

Pull out the lamp and replace it.

NOTE:

Do not touch the glass bulb of a new lamp with your fingers.

Wipe it clean with methyl alcohol .

- Check the orientation of the light line; see step 5.

4. Replacing the halogen lamp of the Cephalometer:

Cephalometer model no. 33 14 320

Remove the reflector.

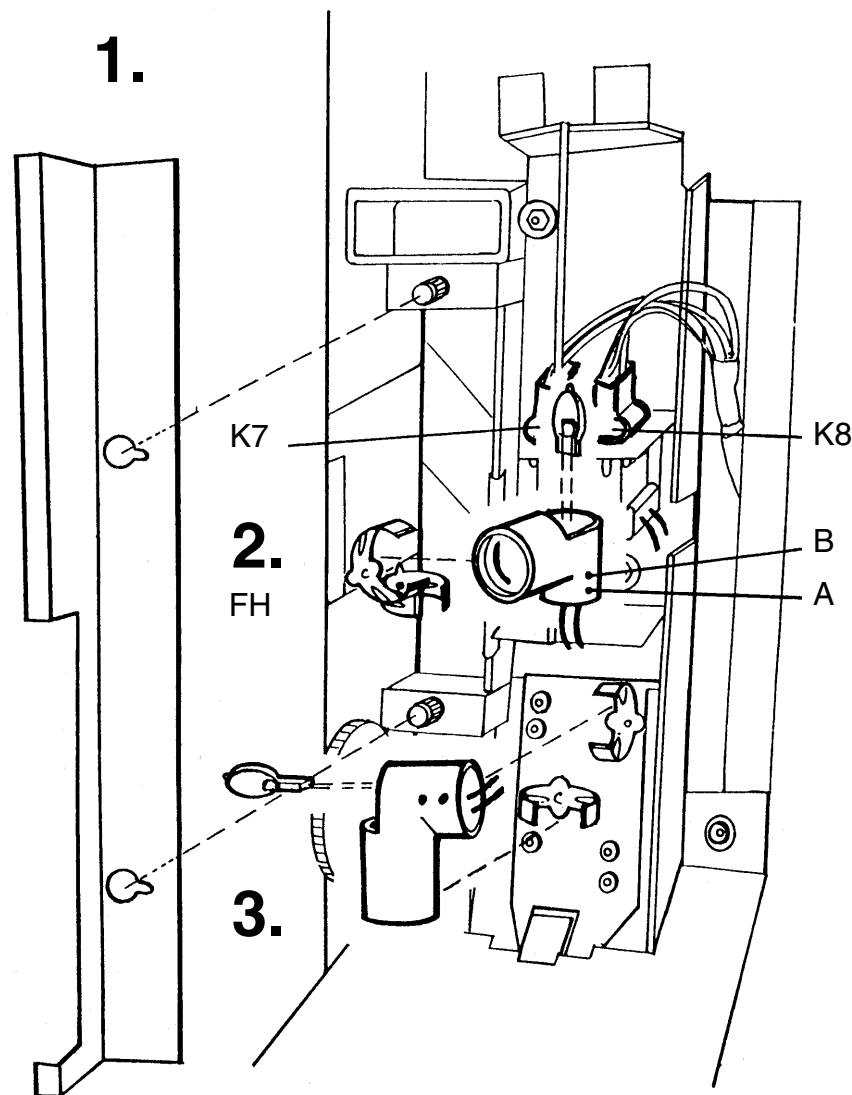
Replace the lamp.

NOTE:

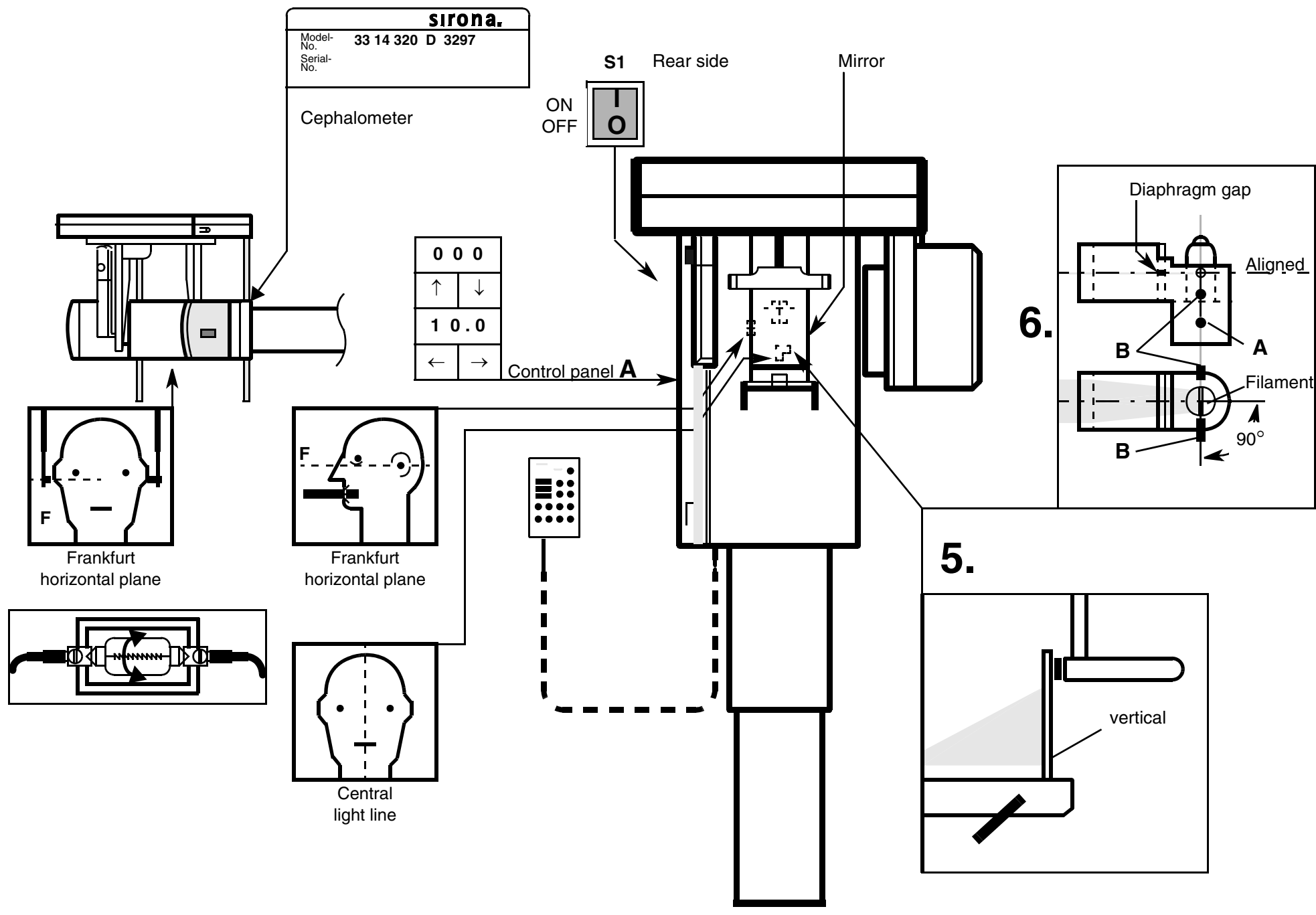
Do not touch the glass bulb of a new lamp with your fingers.

Wipe it clean with methyl alcohol .

**Continued on next page**



## 6.7 Replacing the halogen lamp of the light-beam localizer



### Continued

**5.** Checking the orientation of the light line:

For the adjustment insert the light-beam localizer into the holder of the light-beam localizer unit for the "Central light line" (3.).

Connect plug **K8**.

Move the forehead support ← → to forehead support position **10.0**.

Place the image receptor/film cassette vertically on the bite block and move it against the forehead support.

Switch on the light beam localizer (see Operating Instructions).

- The "Central light line" must appear as a straight line of uniform brightness.

**6.** Correction

Remove the light-beam localizer unit.

Loosen threaded pins **A** and shift the lamp socket:

The lamp filament must be in line with the diaphragm gap and must run parallel to the diaphragm.

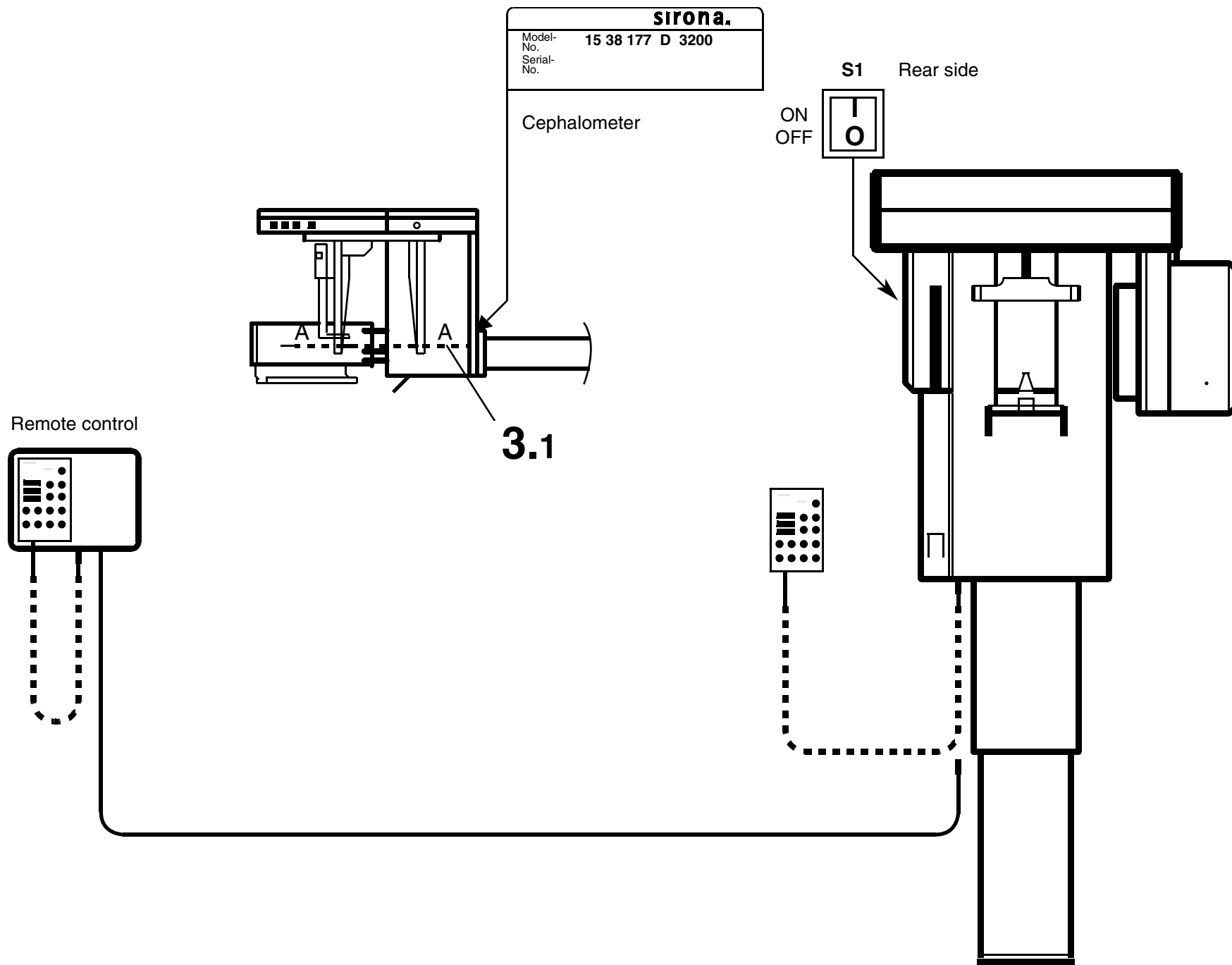
Secure the lamp socket by tightening the threaded pins **A**.

The threaded pins **B** must not touch the glass bulb.

- Assembly the unit completely.

---

## 6.7 Replacing the halogen lamp of the light-beam localizer

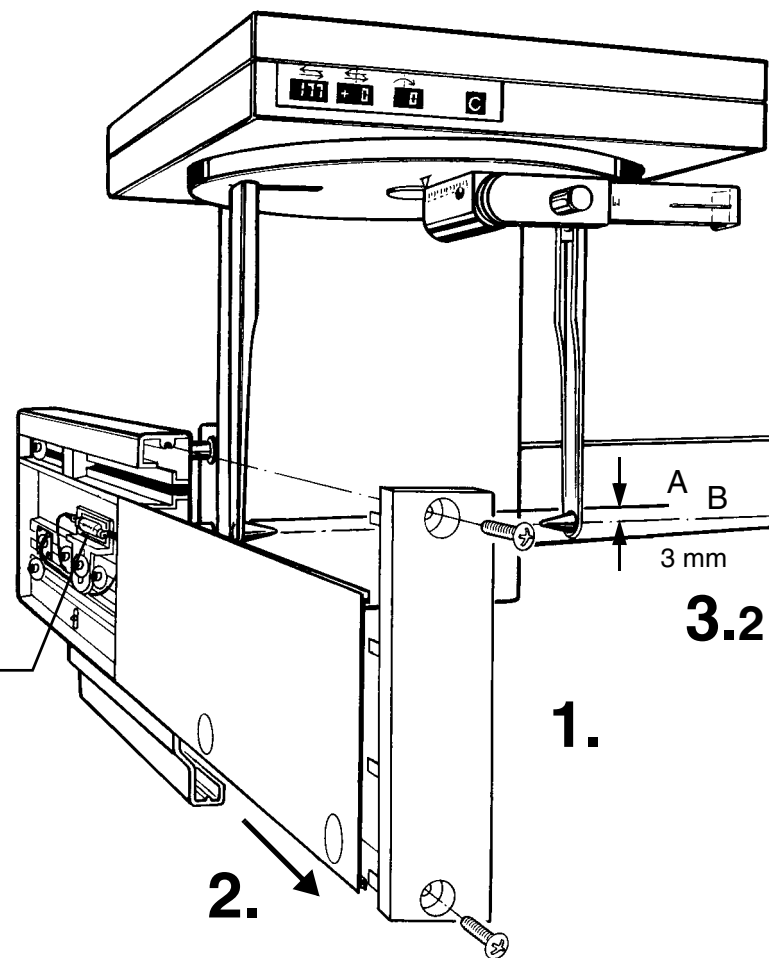
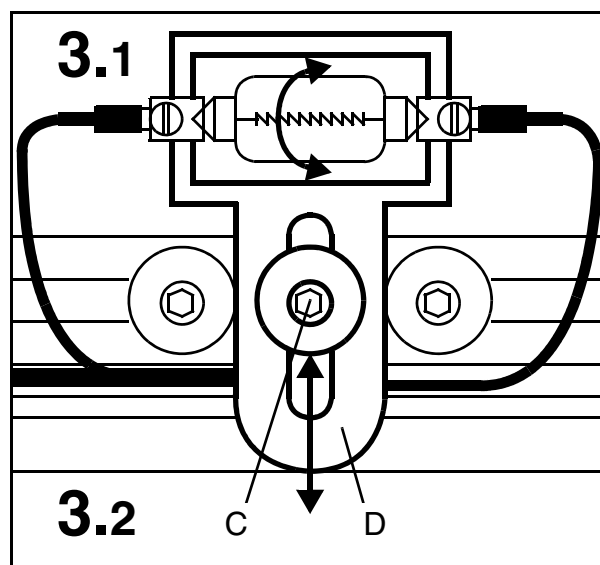




**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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D 3297.077.01.10.02 04.2007

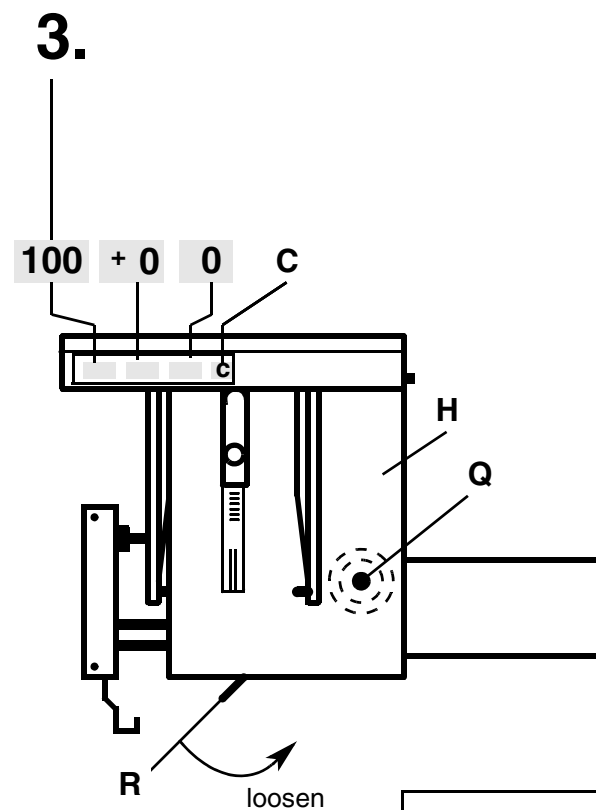
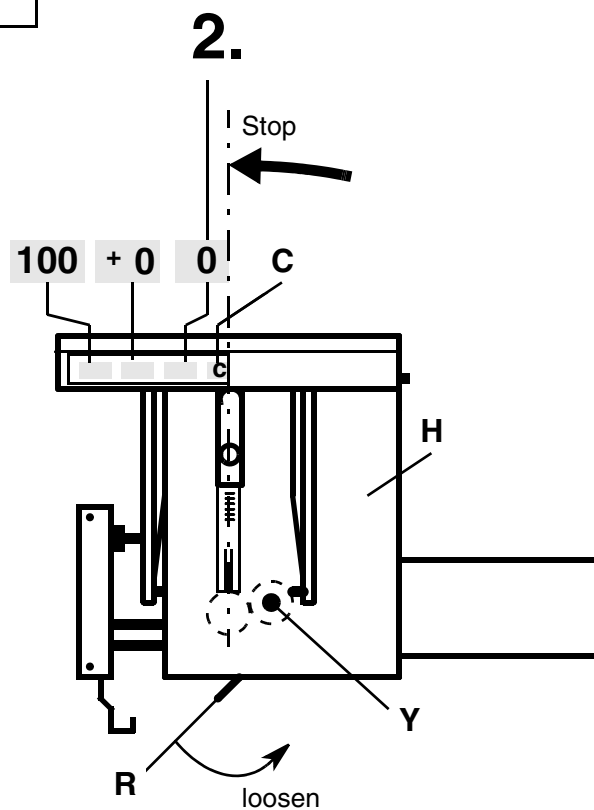
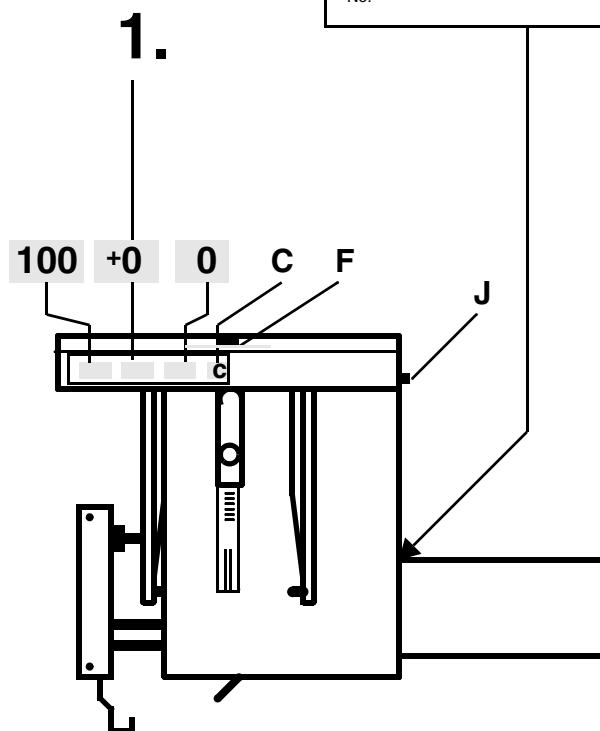
- Turn the unit OFF.
- 1. Unscrew the cover and remove it.
- 2. Pull off the lid from the cassette holder.
- Take the lamp from its socket and install the new one.
- 3. Check the alignment of the light line:  
Turn on the lamp (see Operating Instructions).
- 3.1 Light line **A** of the Frankfurt horizontal plane must appear horizontally on the Cephalometer (see figure at top)!  
For correction: Turn the lamp in the socket.
- 3.2 Light line **A** of the Frankfurt horizontal plane must appear 3 mm above the center **B** of the ear olives!  
For correction: Loosen screw **C** and adjust the height of housing **D**.
- Completely assemble the cassette holder.



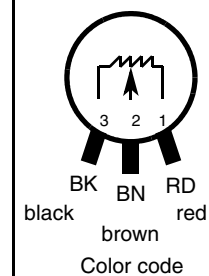
## 6.8 Replacing the lamp of the Cephalometer

Cephalometer model no. 15 38 177

**Sirona.**  
 Model  
 No. 15 38 177 D 3200  
 Serial  
 No.



Potentiometer

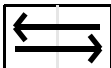


**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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D 3297.077.01.10.02 04.2007

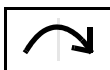
- Turn the unit OFF. Remove the top cover.

**1. Sensor potentiometer F (zero alignment of ear olives)**



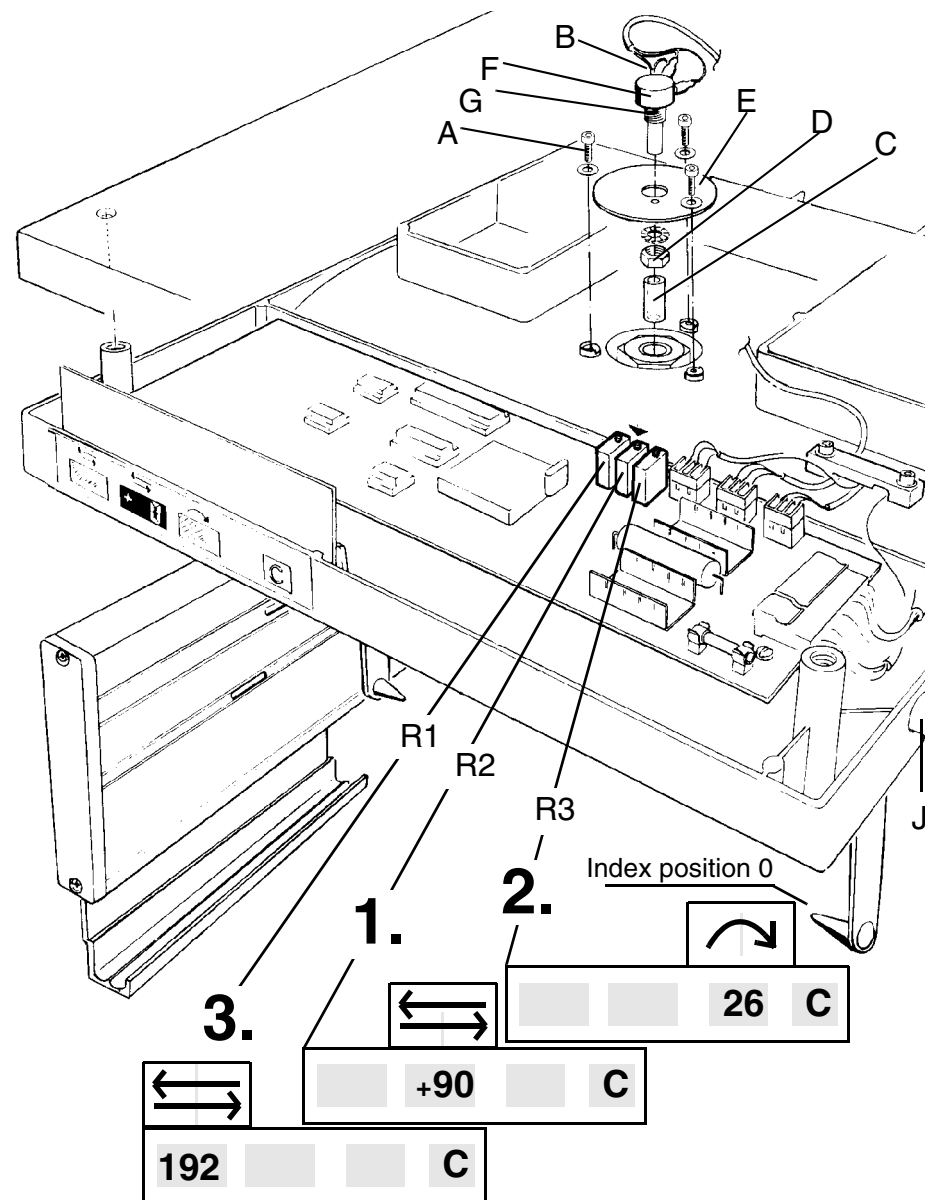
- Loosen screws **A**. Pull out the cable plug **B** and sleeve **C**.  
Loosen nut **D** and remove rotary support **E**. Replace sensor potentiometer **F**.
- Attach nut **D** and rotary support **E** on the new sensor potentiometer.  
NOTE: Watch for lug **G**!  
Slip on sleeve **C** and screw down the new sensor potentiometer.  
Connect the cable plug (observe the color code).
- Turn the unit ON, press the **C** key.
- Loosen the locking screw **J**.  
Place the ear olives in position  $-90^\circ$  (parallel to the cassette holder).  
Retighten the locking screw **J**. The position is correct if the digital display for the rotary movement shows  $-90$ !  
If  $-90$  does not appear, loosen screw **A** again and turn the rotary support **E**.
- Loosen locking screw **J**.  
Place the ear olives in position  $+90^\circ$  (parallel to the cassette holder).  
Retighten the locking screw **J**. The position is correct, if the digital display for the rotary movement shows  $+90$ !  
If  $+90$  does not appear, turn potentiometer R2.
- Repeat the last two steps until no further readjustment is required.
- Reattach the top cover.

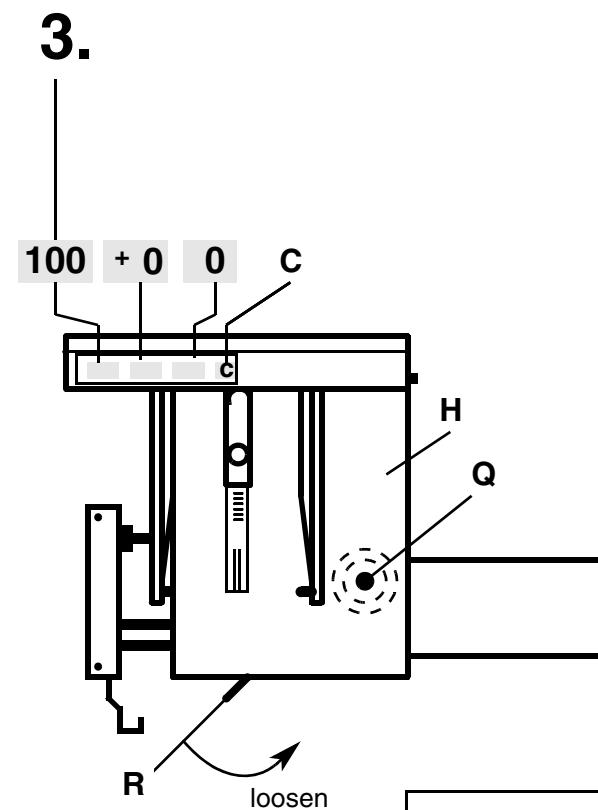
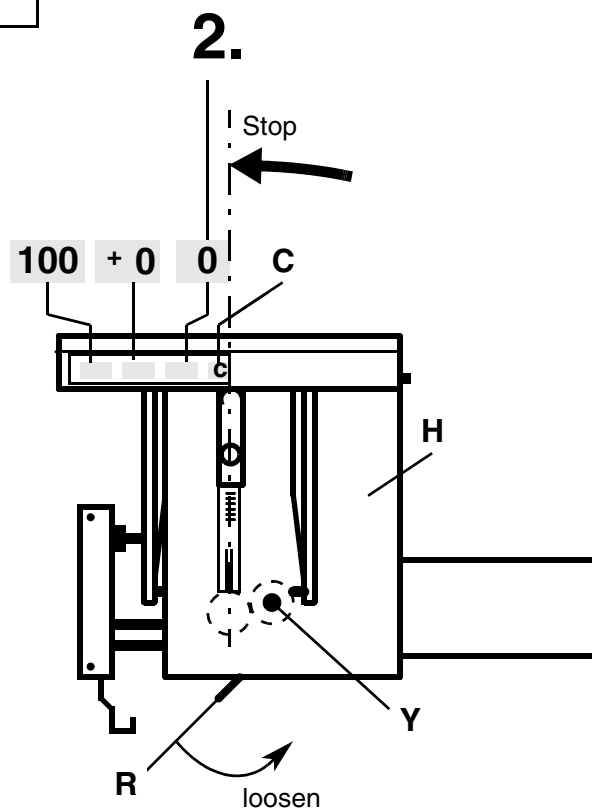
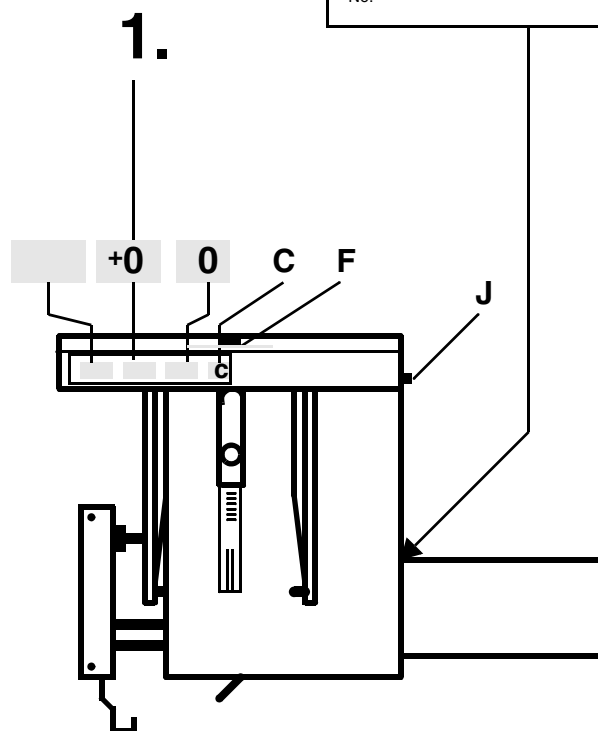
**2. Sensor potentiometer Q (zero alignment of tilt)**



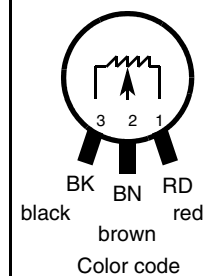
- Remove the front cover **H**. Loosen screw **K** and pull off the cogwheel.  
Pull cable plug **L**. Loosen screws **M**.  
Loosen nut **N** and remove holder **O**. Replace sensor potentiometer **Q**.
- Tighten the mounting screws of the new sensor potentiometer. NOTE: Watch out for lug **P**!  
Reconnect the cable plug (observe the color code).  
Put on the cogwheel and tighten screw **K**.

Continued on next page



**sirona.**Model-  
No. 15 38 177 D 3200  
Serial-  
No.

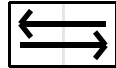
Potentiometer



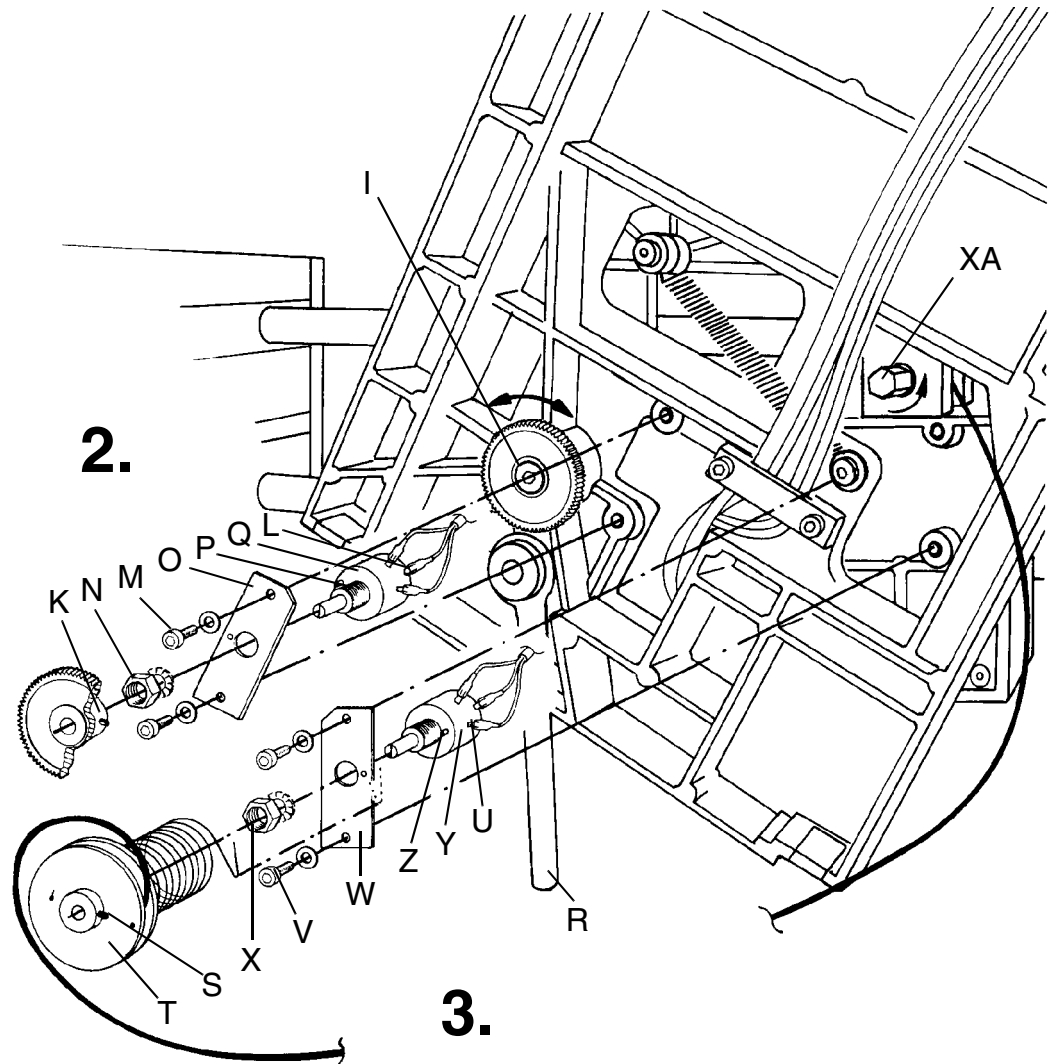
**Continued**

- Turn the unit ON, press the **C** key.
- Release the locking lever **R**. Turn the head holder to the stop in the horizontal position (0°, see Operating Instructions). Fasten locking lever **R**. The zero alignment is OK if the digital display for the tilting movements shows **0**!
- If **0** is not indicated, loosen screw **I** of the fixed cogwheel and turn the cogwheel.
- Swing the head holder from its zero position to the stop; **26** must light up. If **26** is not displayed, adjust potentiometer R3.
- Reattach the top and front covers.

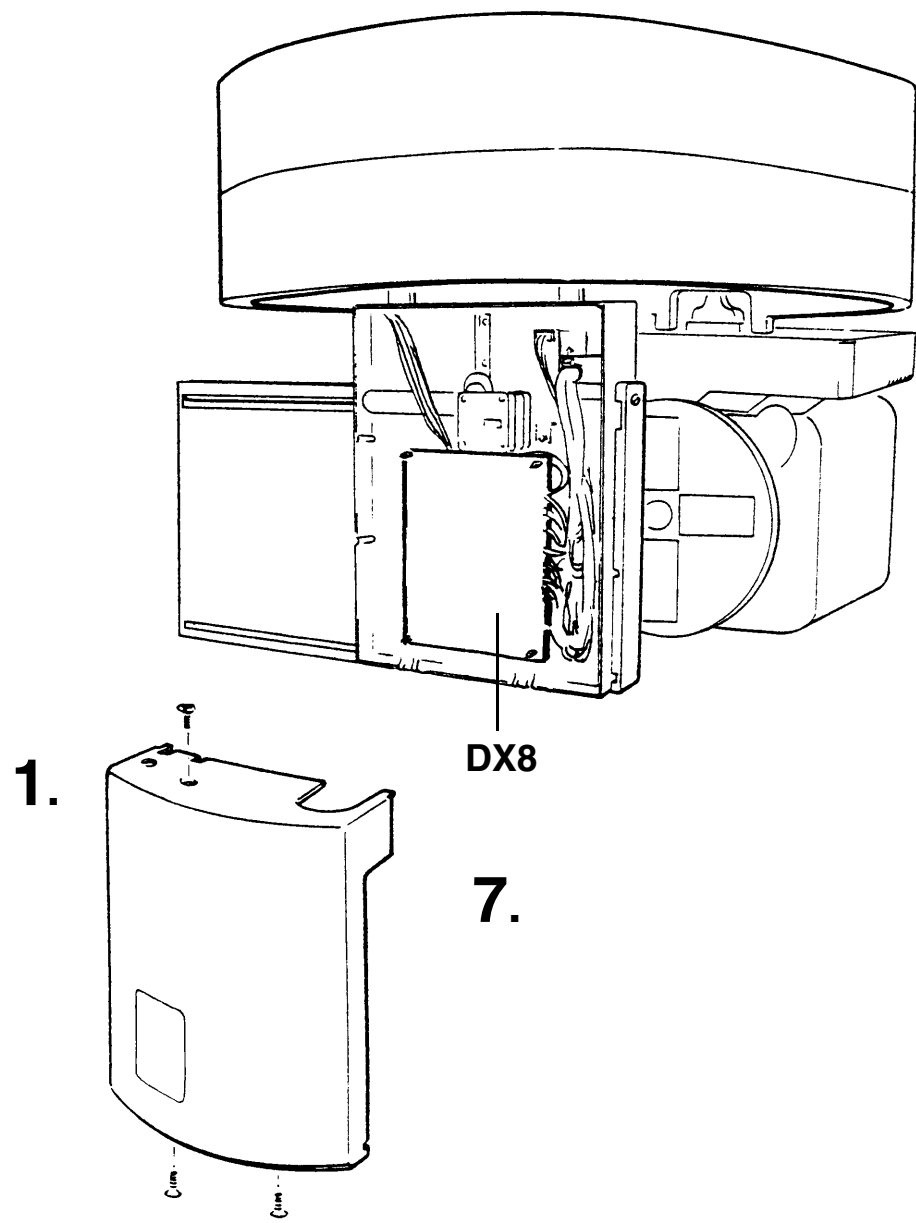
**3. Sensor potentiometer Y (position of cassette holder)**



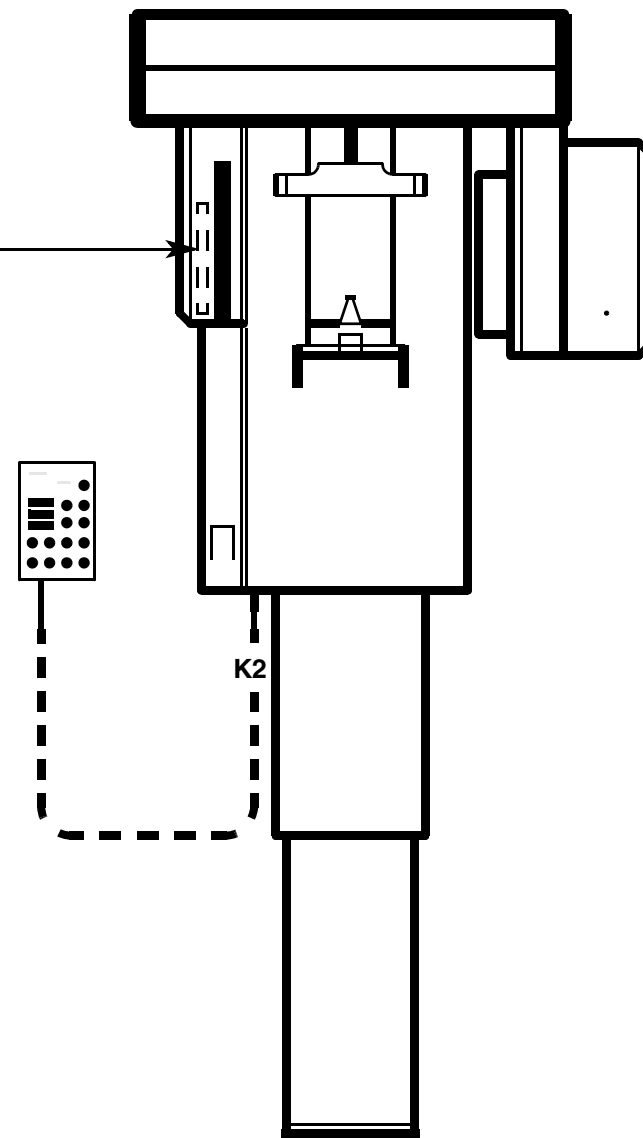
- Remove the front cover **H**. Release locking lever **R**. Move the head holder to its stop in the 26° position. Fully insert the head holder! →  
Loosen screw **S** and pull off rope pulley **T**. CAUTION: Unhook the spring! Pull cable plug **U** and remove screws **V**.  
Loosen nut **X** and remove holder **W**. Replace sensor potentiometer **Y**.
- Screw down the new sensor potentiometer. NOTE: Watch out for lug **Z**! Connect the cable plug (observe the color code). Fit the rope pulley **T** on the axis of the sensor potentiometer and hook the spring into the holder **W**. NOTE: Do not coil up the rope. Tighten screw **S**.  
Turn the rope pulley 3 turns to the left and hold it in this position. Place the rope in the rope pulley and coil it up by turning the pulley cw.
- Turn the unit ON. Press the **C** key. Fully insert the cassette holder →. The adjustment is correct if the digital display for the longitudinal movement shows **100**!
- If **100** does not appear, readjust the rope with adjustment knob **XA**.
- Fully pull out the cassette holder ←; **192** must be indicated. If **192** does not appear, readjust potentiometer R1.
- Reattach the top and front covers.



## 6.9 Replacing/adjusting the sensor potentiometer of the Cephalometer




DX8

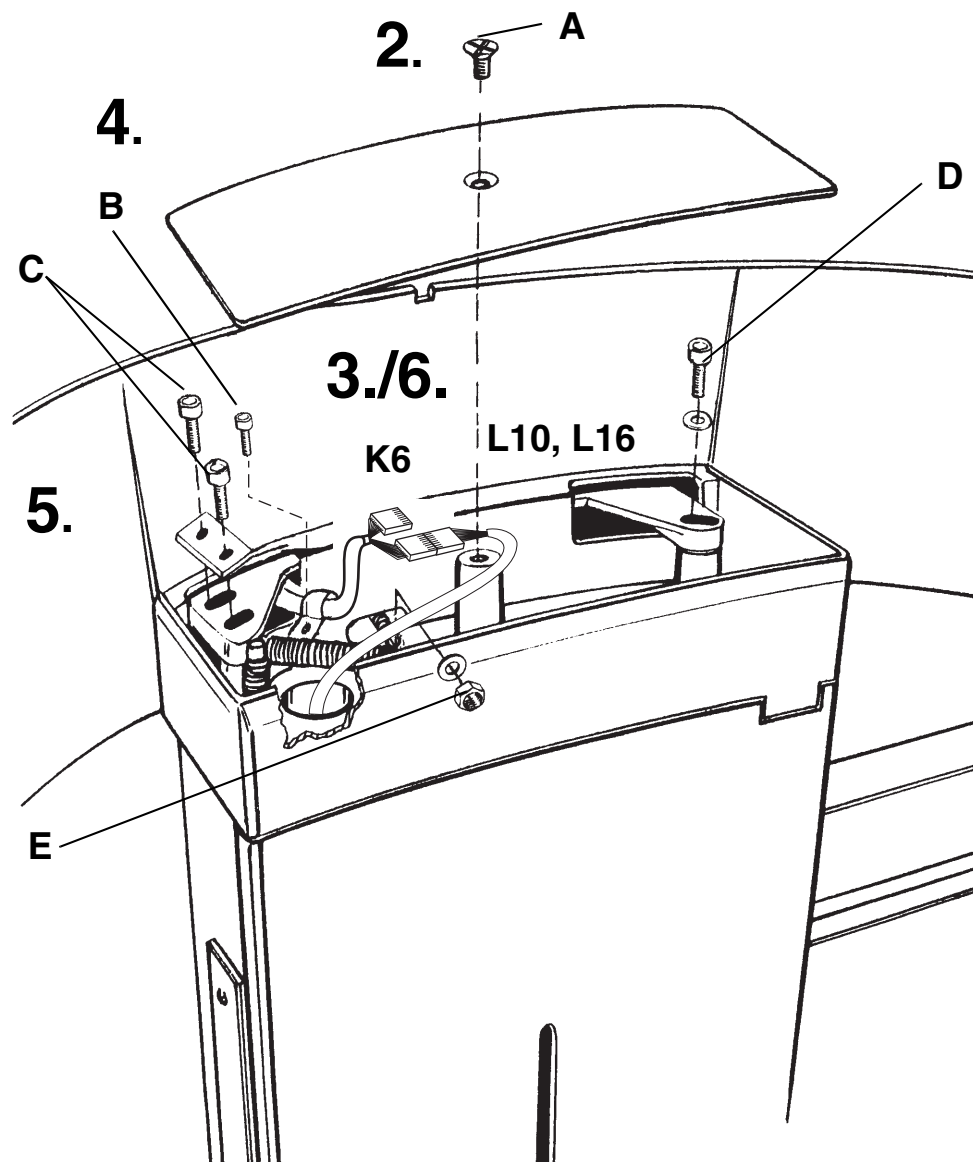


**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

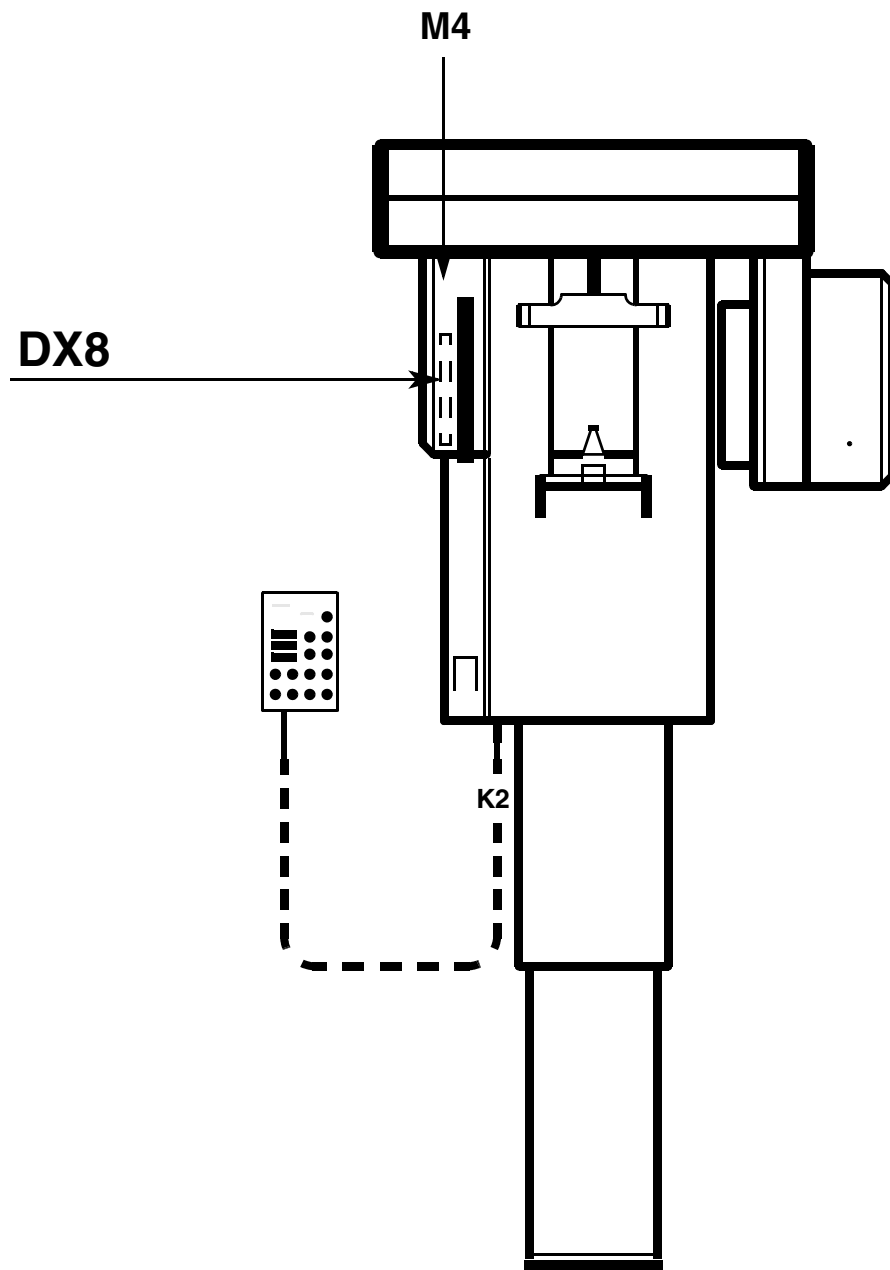
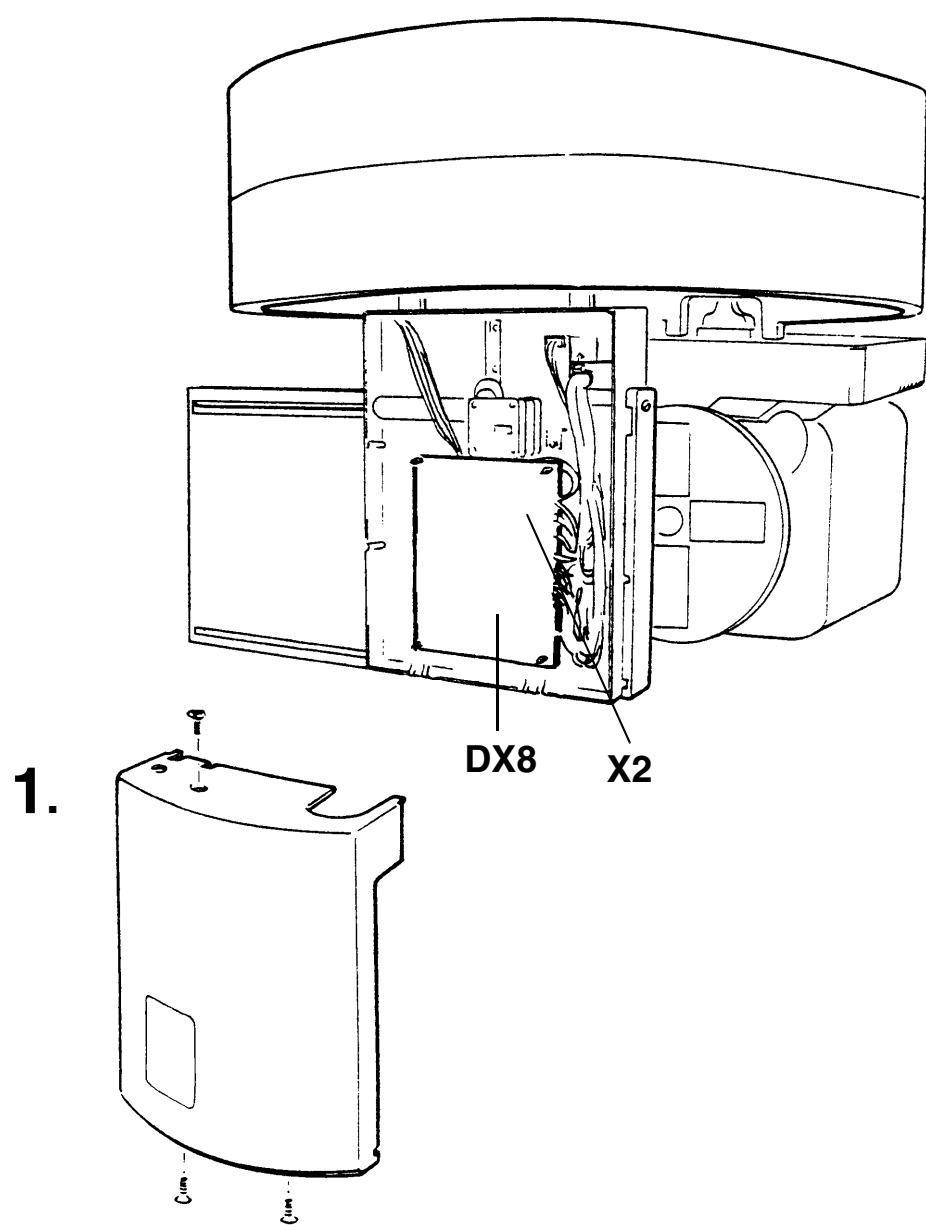
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D 3297.077.01.10.02 04.2007

**Take anti-static measures to prevent ESD damage!**

- Turn the unit OFF.
- 1. Remove the cover.
- 2. Take out screw **A** and remove the cover.
- 3. Disconnect plug K6 (L10 and L16).
- 4. Unscrew the cable clamp (screw B).
- 5. Remove screws **C, D** and nut **E**;  
while watching for shims and washers!  
Attention: Hold and remove the cassette holder.
- 6. Screw on the new cassette holder.  
Connect L10 and L16 (connector K6).  
Remount the cable clamp.  
Replace the cover and insert screw **A**.
- 7. Tighten the screw of the cover.
- Adjust the cassette holder.  
Proceed according to section '**Phantom radiograph**' from step 4,  see page 4 - 5.



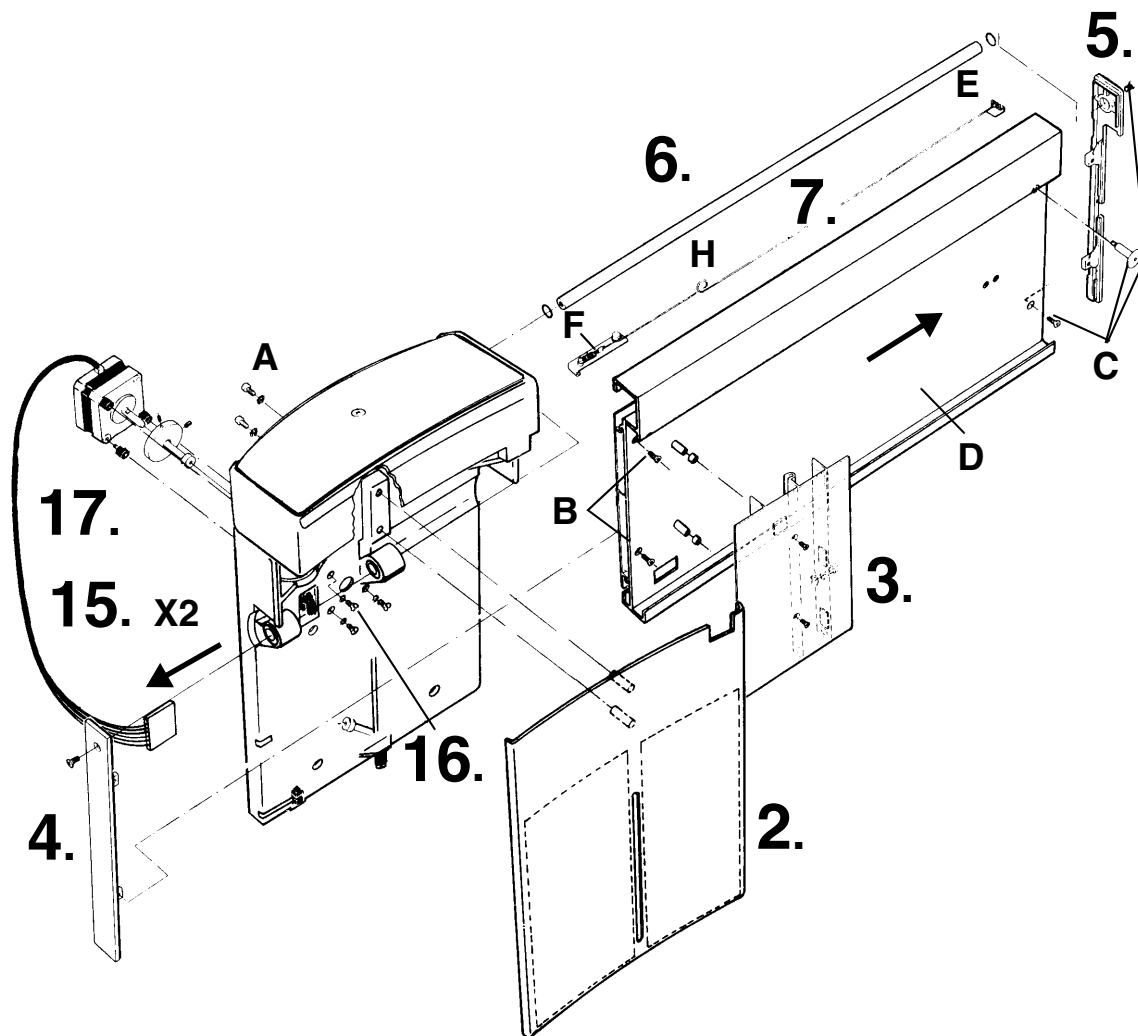
## 6.10 Replacing the cassette holder for panoramic radiographs





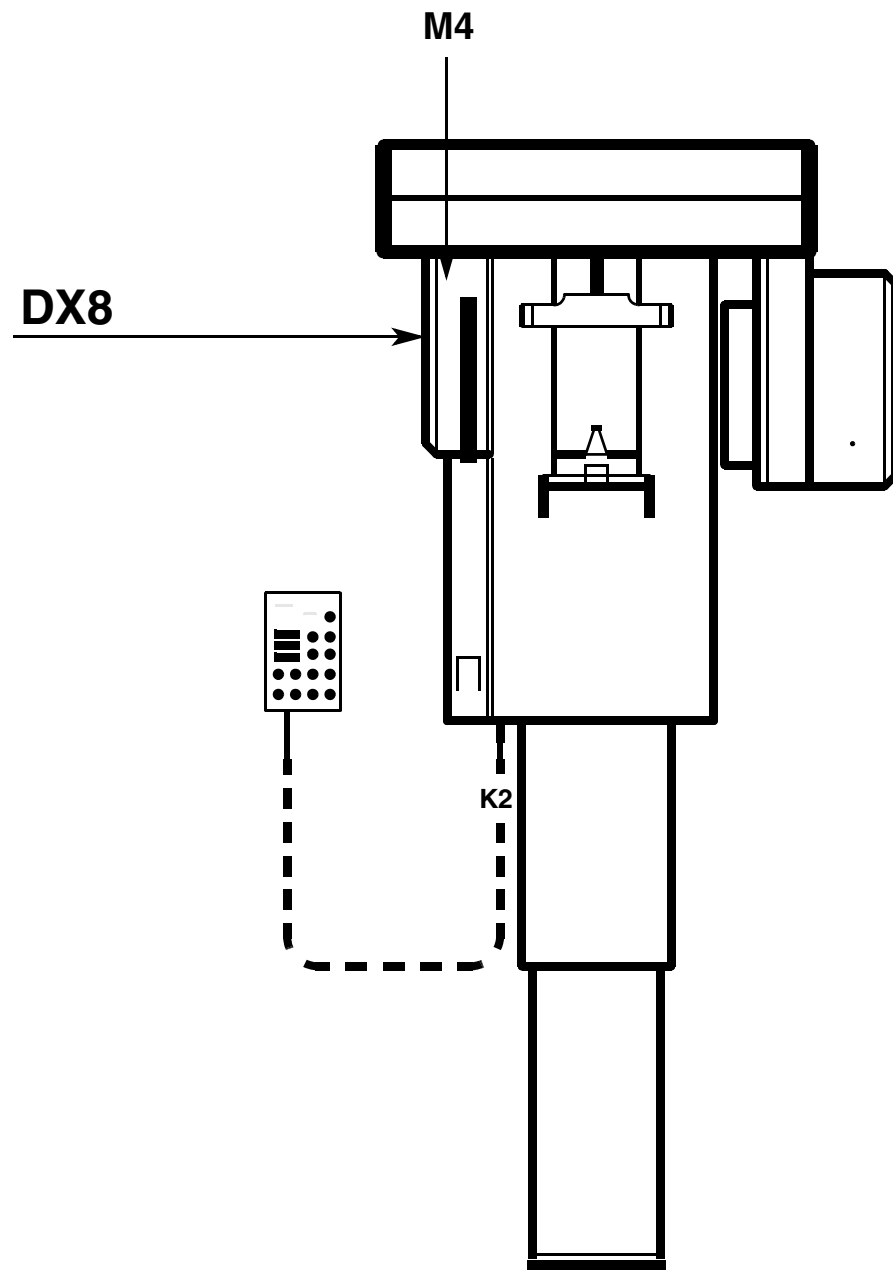
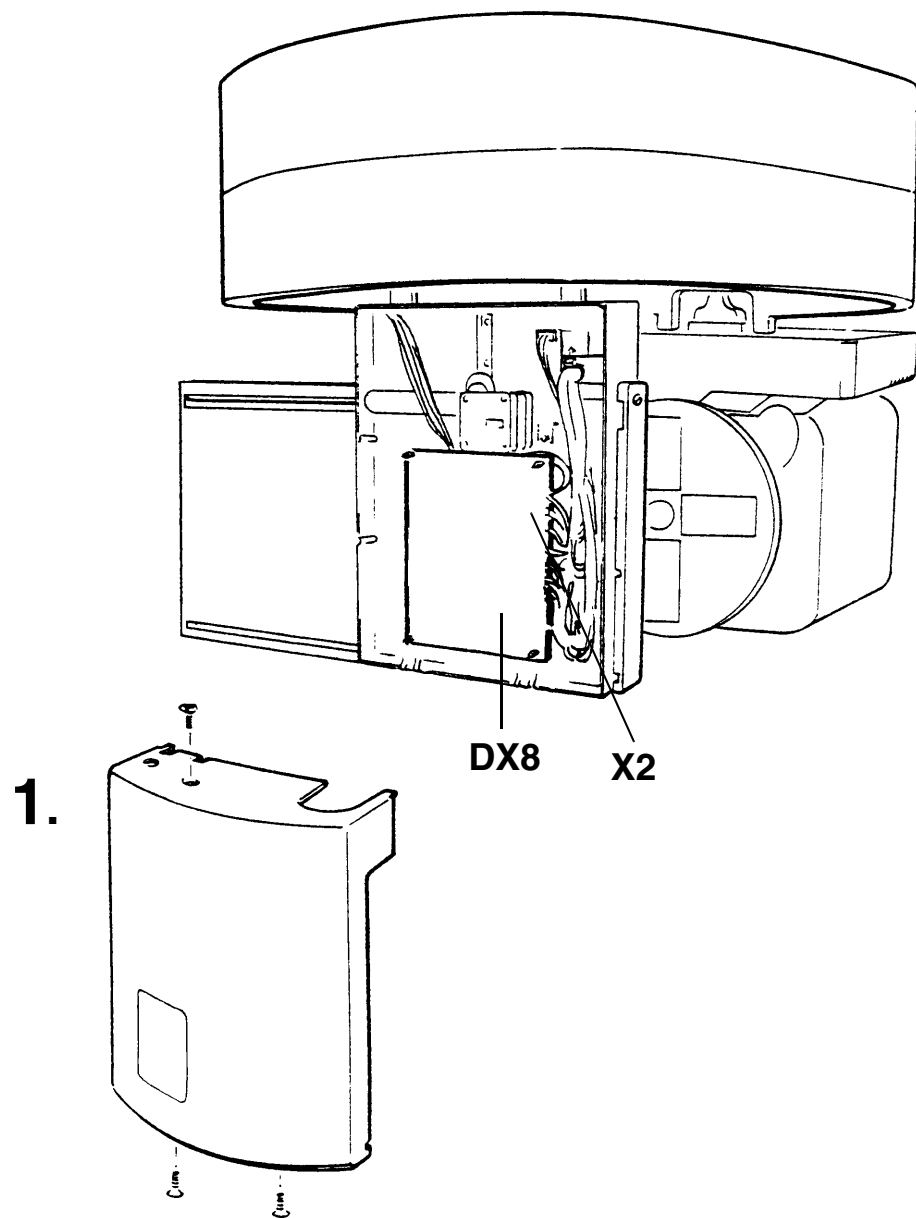
**Take anti-static measures to prevent ESD damage!**

- Turn the unit OFF.
- 1. Remove the cover from the cassette holder.
- 2. Take out screws **A** and remove the secondary diaphragm.
- 3. Remove 2 screws and the profile metal sheet.
- 4. Remove screws **B** and the profile metal sheet.
- 5. Remove screws **C** and the profile metal sheet.
- 6. Pull out the guide shaft with the O rings.
- 7. Unhook the tension spring with holding bracket **F** and the rope with holding bracket **E**.  
Pull the profile metal sheet **D** from its guide.  
Remove the tension spring from the rope and attach it to the new rope.
- 8. Place the profile metal sheet **D** in the guide and slide it in 20 mm.
- 9. Lay new rope in guide groove of drive wheel as loop **H** and hook it up to retaining plates **E** and **F**, as shown in the drawing next page.
- 10. Pull the rope with holding bracket **E** through the profile metal sheet **D**.
- 11. Slide the profile metal sheet **D** halfway onto the guide roller.
- 12. Hook the holding bracket **E** with the rope into the profile metal sheet.
- 13. Wind the rope around the peg on holding bracket **F** and engage the tension spring.  
Hook the holding bracket **F** into the profile metal sheet.
- 14. Insert the guide shaft and place the O rings on both ends of the shaft.
- 14.1 Slide retaining plates **E** and **F** in the direction of the arrow up to their stops, as shown in the drawing next page.
- Completely assembly the cassette holder.



**Continued on next page**

## 6.11 Replacing the rope and/or the cassette drive motor M4

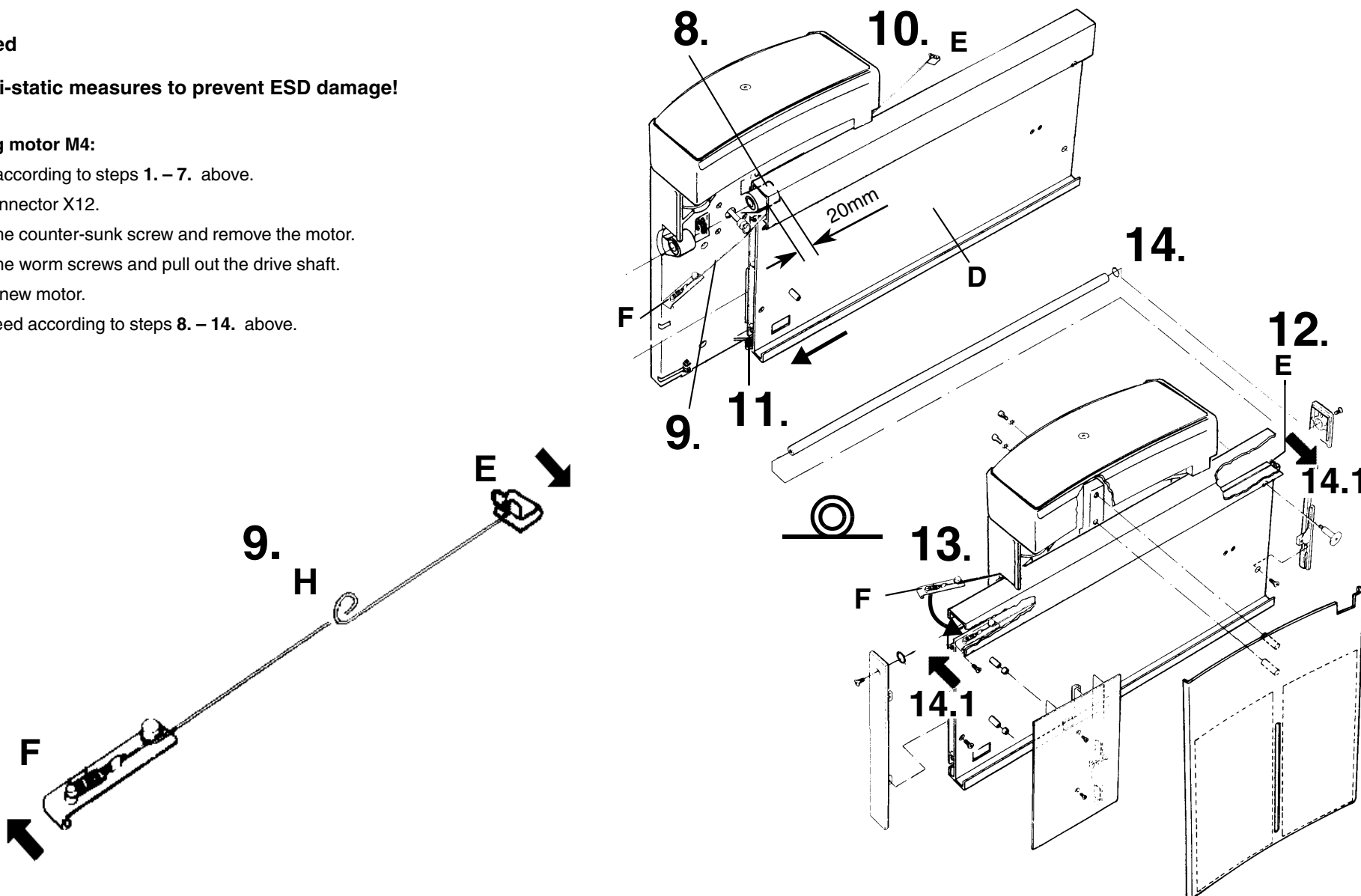


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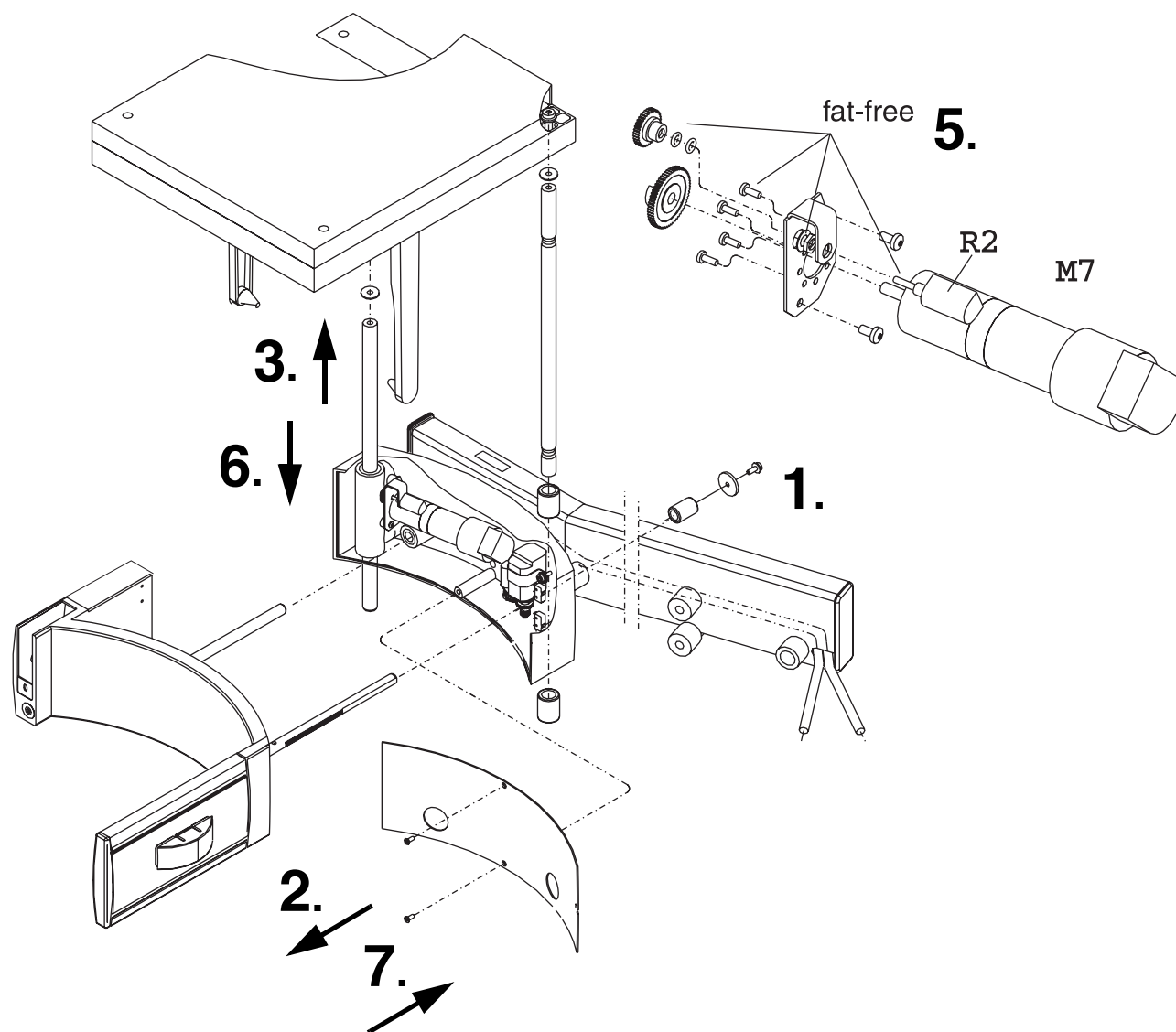
Take anti-static measures to prevent ESD damage!

**Replacing motor M4:**

- Proceed according to steps 1. – 7. above.
- 15. Unplug connector X12.
- 16. Take out the counter-sunk screw and remove the motor.
- 17. Take out the worm screws and pull out the drive shaft.
- Install the new motor.
- Now proceed according to steps 8. – 14. above.



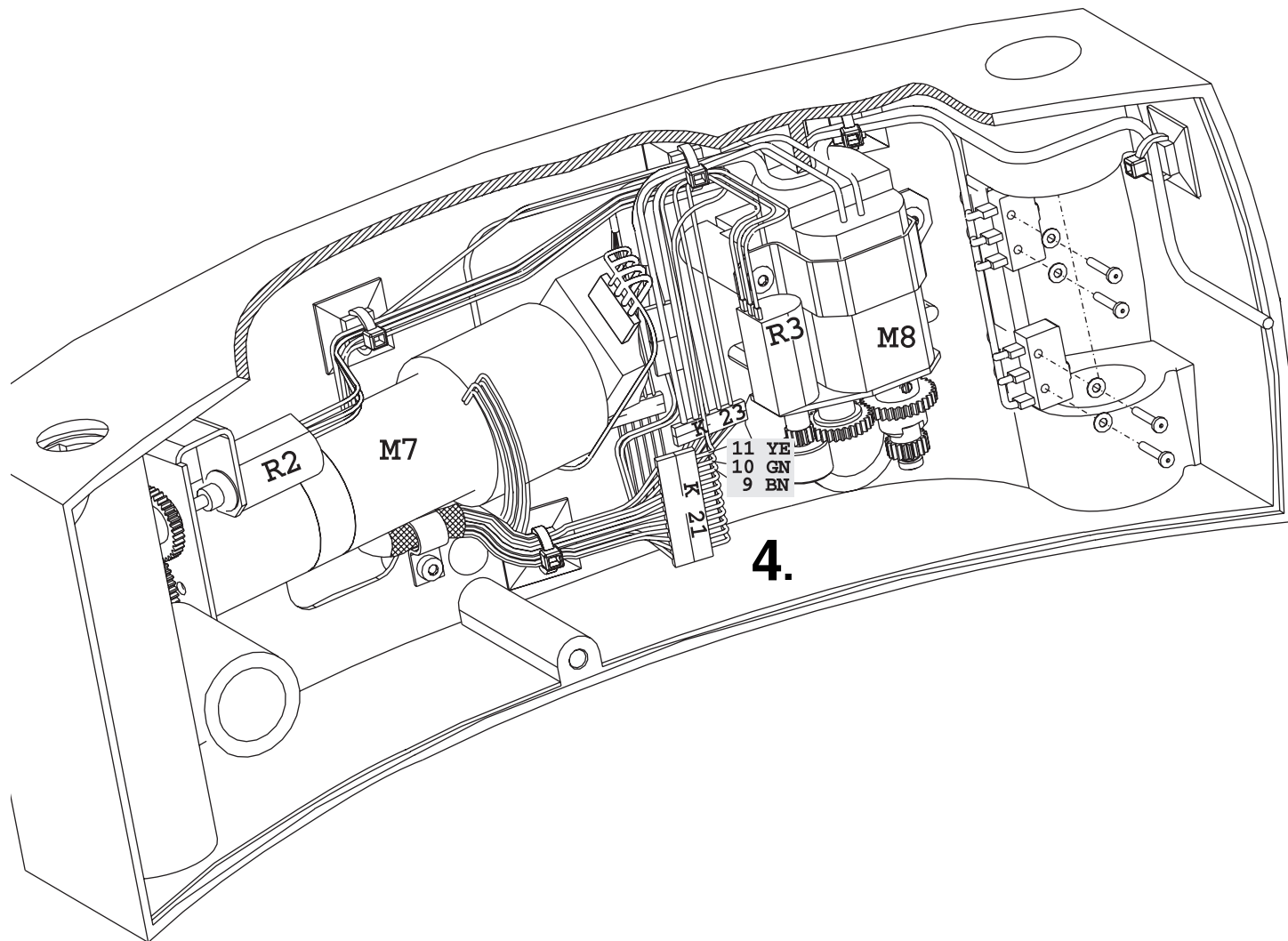
## 6.11 Replacing the rope and/or the cassette drive motor M4



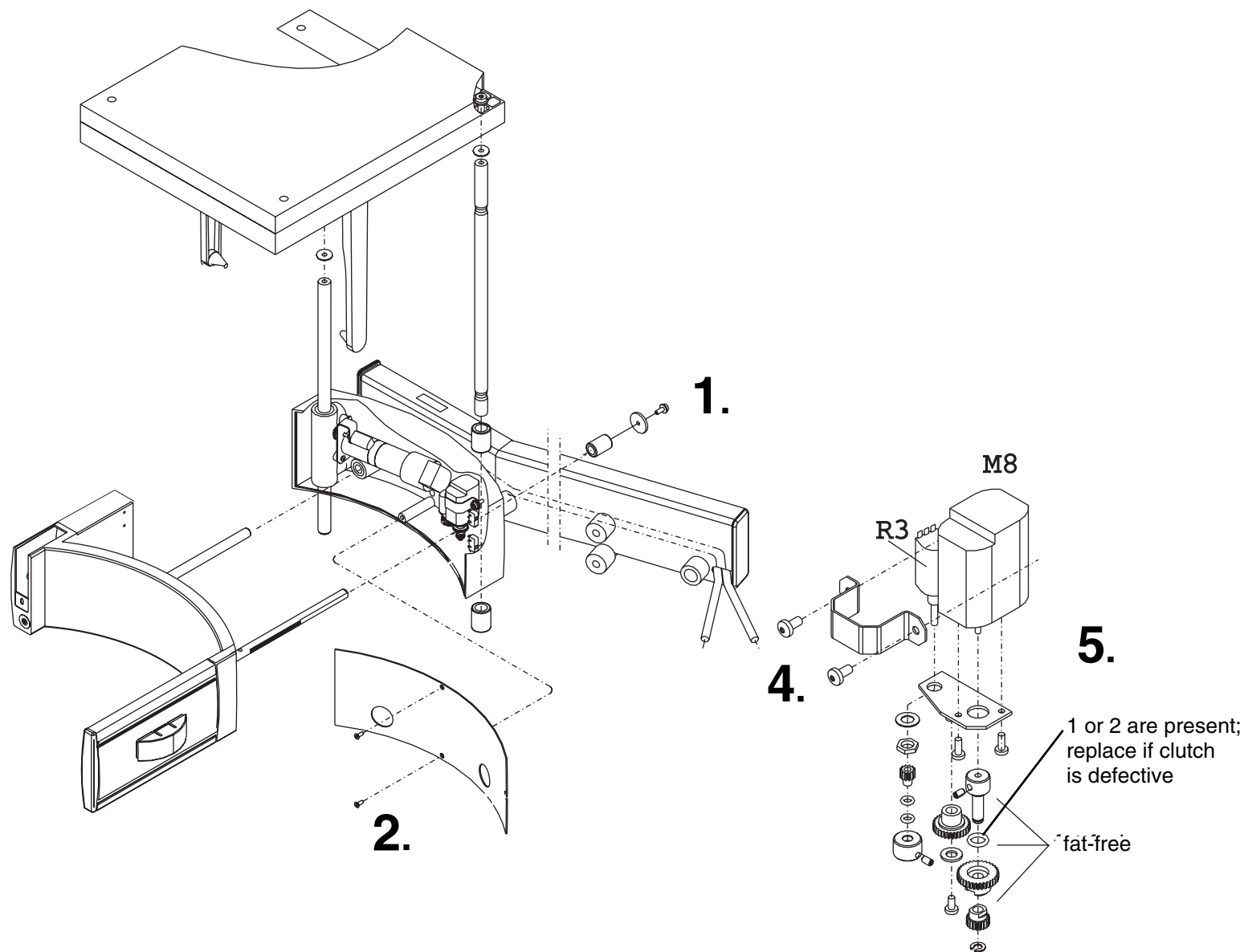
**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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1. Take out the screw.  
Select Service routine S.34, test step 5. Move the cover to the front and take it away.
2. Unscrew the cover.
3. Select Service routine S.34, test step 1. Move the Cephalometer fully to the top by passing the limit switch until the toothed rod is accessible.
  - Turn the unit off.
4. Unplug connector **K21**.  
Remove the motor with the potentiometer.
5. Check and preadjust the new motor M7 with potentiometer R2:  
Confirm by visual inspection that the driving pinion engages with the full width of the pinion in the toothed rod.  
**Adjust the potentiometers so that the ohm-meter reads 9k $\Omega$  between pin 1 and pin 2.**  
Install the new motor with potentiometer.
  - Turn the unit ON.
6. Perform Service routine **S.34**, test step 4 to drive down the toothed rod.
7. Assemble the unit completely.

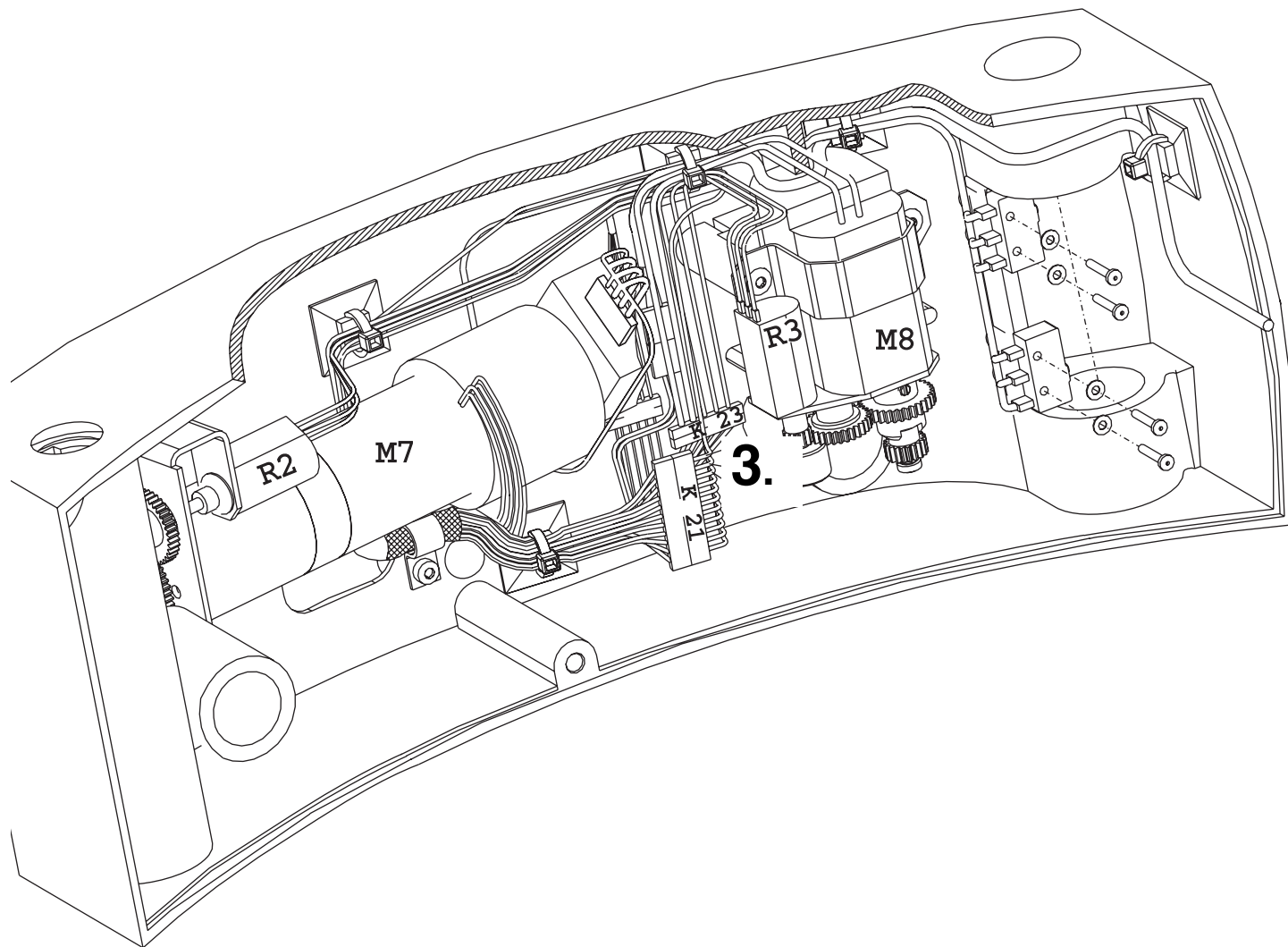


## 6.12 Replacing motor M7 and potentiometer R2

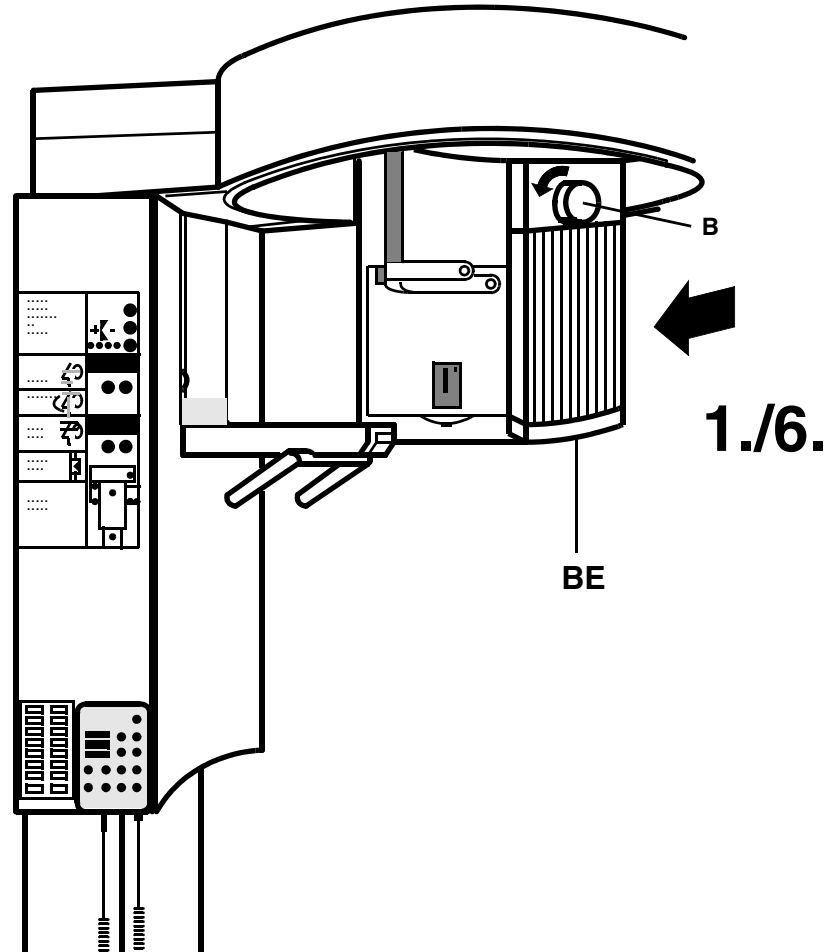


NOTE: Do not move the secondary diaphragm by hand.

1. Take out the screw.  
Select Service routine S.34, test step 5. Move the cover to the front and take it away.
2. Unscrew the cover.
  - Turn the unit OFF.
3. Unplug connector **K23**.
4. Unscrew the motor with potentiometer.
5. Check and preadjust the new motor M8 with potentiometer R3:  
Confirm by visual inspection that the driving pinion engages with its full width in the toothed rod.  
**Adjust the potentiometers so that the ohmmeter reads 9k $\Omega$  between pin 1 and pin 2.**  
Install the new motor with potentiometer and tighten the screws.
6. Turn the unit ON.
7. Perform Service routine **S.34**, test step 3.
8. Assemble the unit completely.

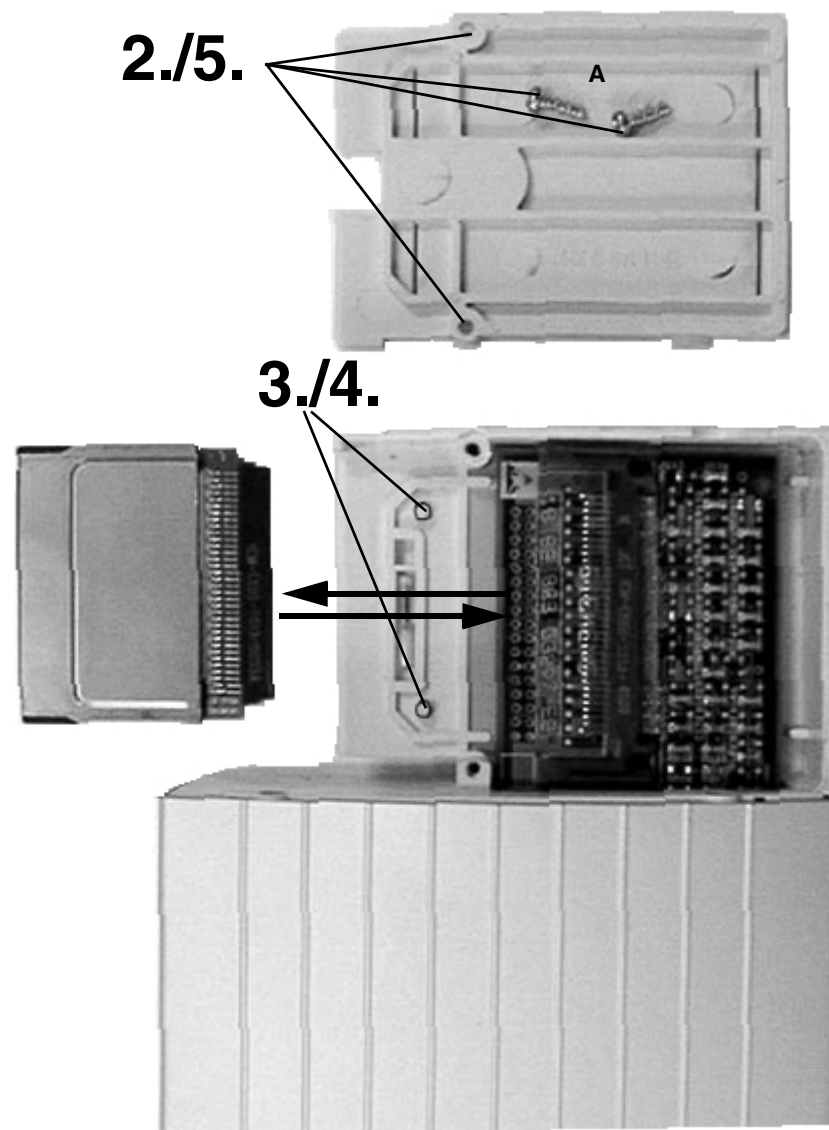


## 6.13 Replacing motor M8 and potentiometer R3

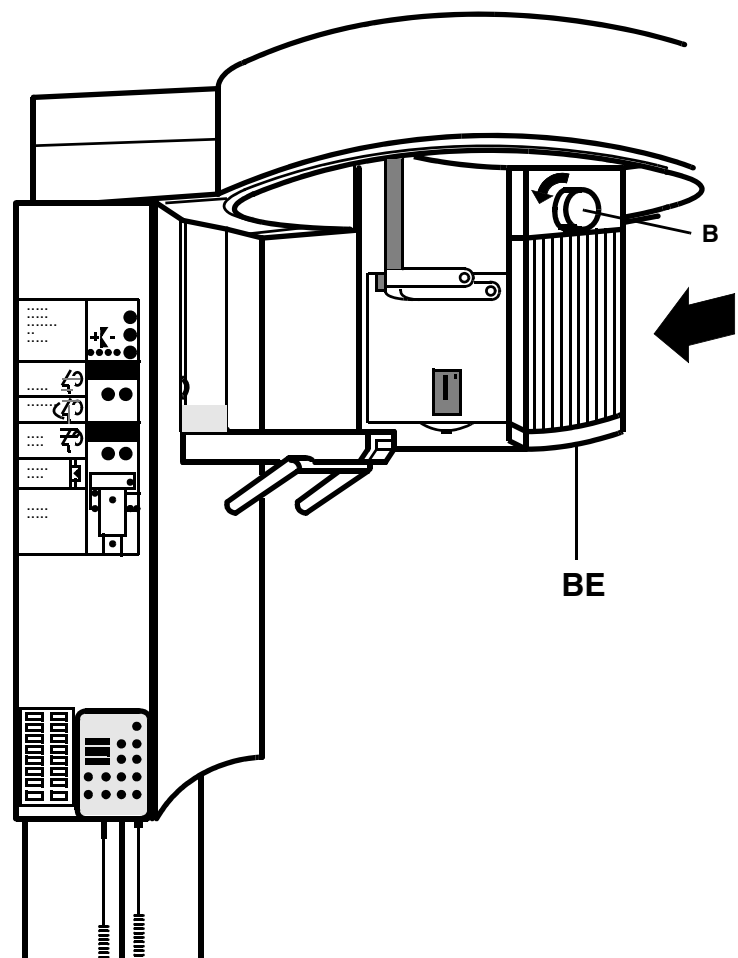




1. To remove the image receptor turn control knob **B** to the right and pull out the image receptor.
  2. Unscrew the two screws **A**. Take off the cover.
  3. Lift socket contact of image receptor slightly, since it is attached to the housing. Then pull the socket contact off.
  4. Attach the new socket contact, making sure that the plug connection is correctly attached. Press down to engage.
  5. Unscrew the cover.
  6. Push in the image receptor BE up to the endstop (turn control knob **B** to the left).
  7. Perform the pin position recognition with Service routine S.32.3 for Panorama radiography and/or pin position recognition with Service routine S.33.3 for Cephalometry.
  8. Generate a digital test image.  
Press exposure button.  
A rotation without radiation is initiated.  
A dialog box appears.  
If the display  
**OK**  
appears, the data path is functioning correctly.  
Actuate the **OK** softkey.  
The test image generated is then displayed on the screen.  
If the display  
**Error**  
appears, see the instructions in the Service Manual.
- Close the test image ([Ctrl]+[F4]).



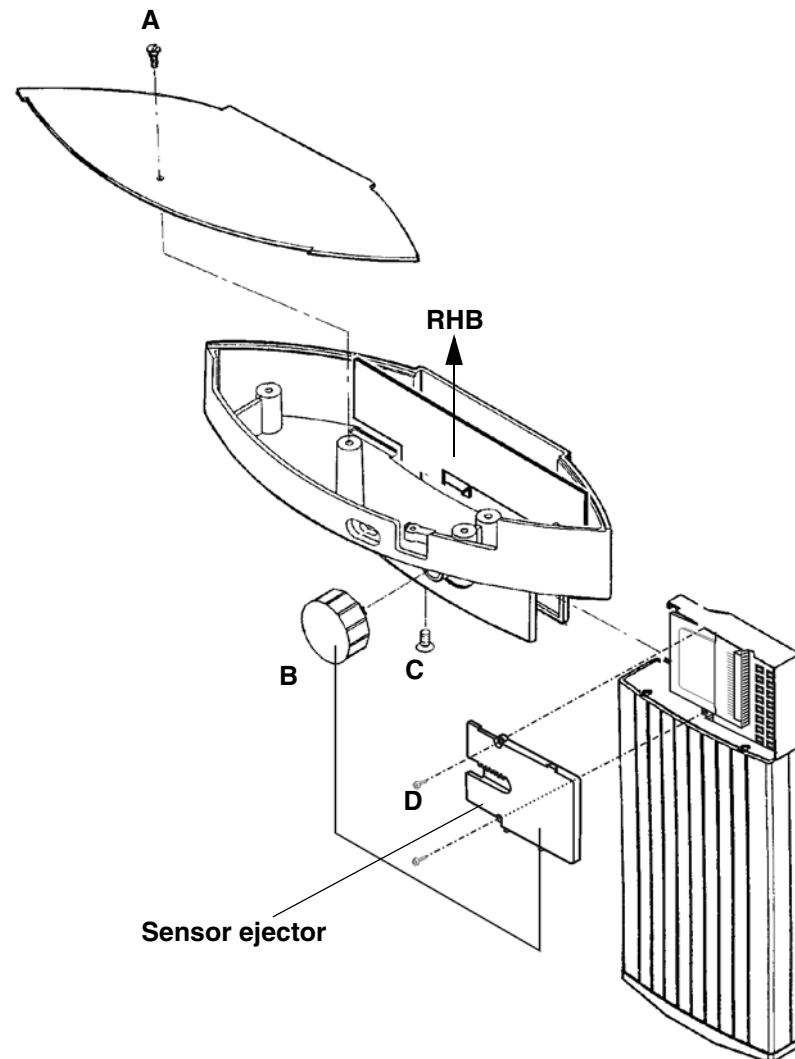
## 6.14 Replacing socket contact for image receptor



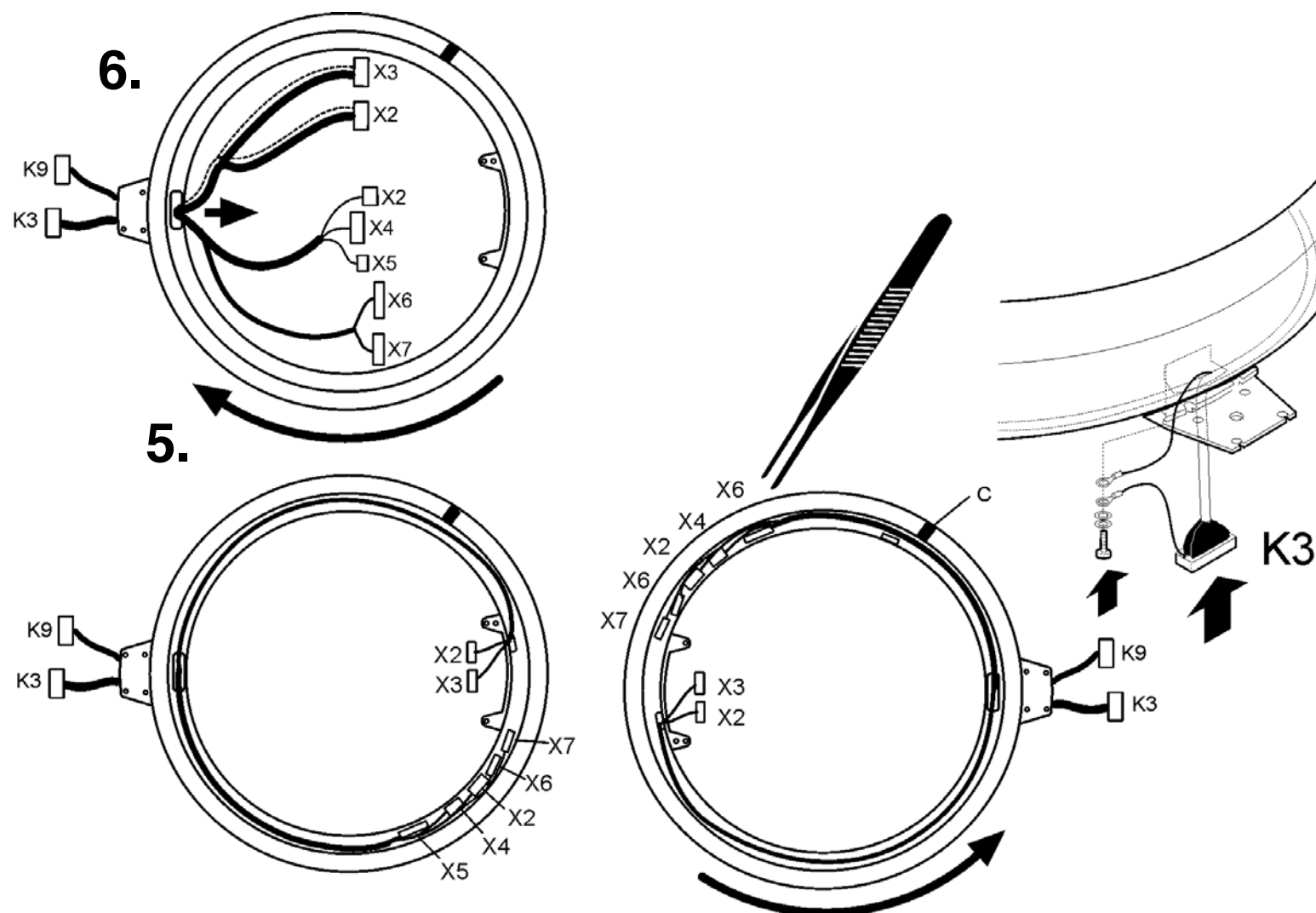
**ATTENTION: Always turn the unit OFF before connecting a measuring instrument or replacing any parts!**

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- If the image receptor cannot be screwed in and out easily or fits into the guide too loosely, replace rotary knob or/and sensor ejector.
- 1. To remove the image receptor, turn rotary knob **B** clockwise and pull out the image receptor.- 1.1 Check the sensor ejector for any damages on the teeth; if they are damaged, replace sensor ejector.
- 1.2 Remove two screws **D**. Replace sensor ejector.
- 2. Replace rotary knob **B**- 2.1 Unscrew upper cover **A**.
- 2.2 Remove lower Torx screw **C**.
- 2.3 Lift PCB RHB slightly.
- 2.4 Pull out rotary knob **B**.
- 2.5 Insert new rotary knob and push down PCB RHB again.
- 2.6 Turn in screw **C** and reattach the upper cover using the screws.

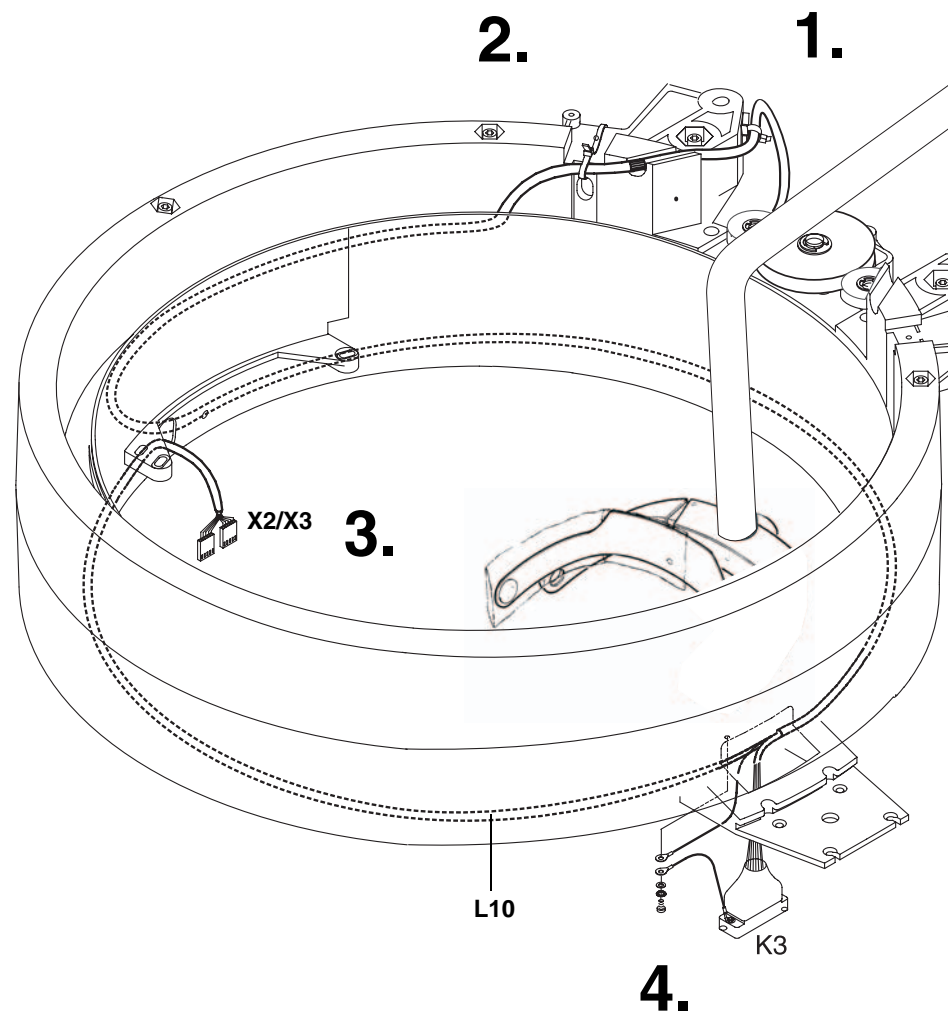


## 6.15 Replacing rotary knob and sensor ejector

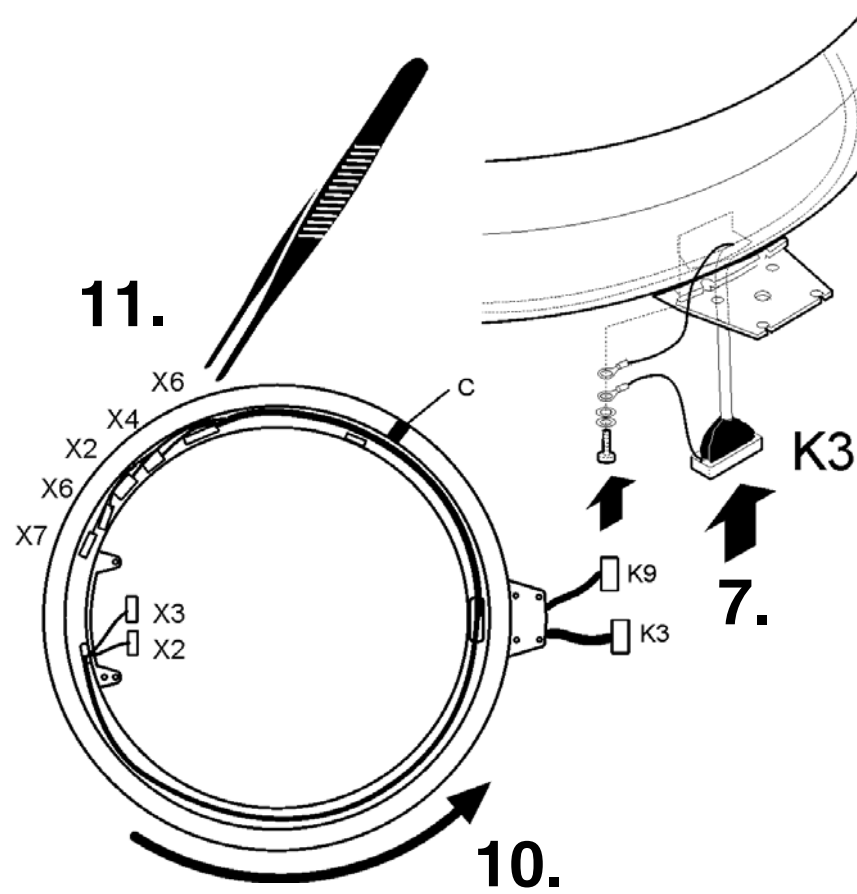
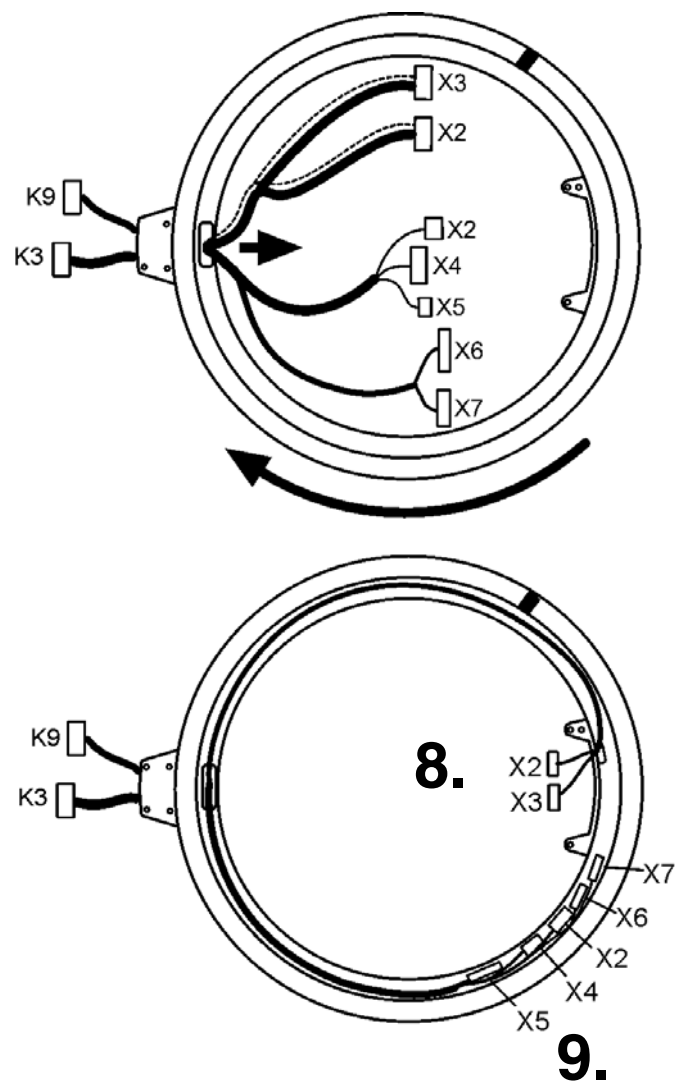


- Open the unit.
  - Remove the old ring cable.
1. Pull off all plug connections, shields and ground wires on the unit end of the old ring cable.
  2. Cut through the cable ties and remove them; loosen the cable clamps. Cut off the unit-end plugs on ring cable L10. Lift the cable, making sure not to damage the segmental wheel.
  3. Pull off the plug connections K6 (cassette holder)/X2, X3 (image receptor). Remove annular core and shielding, loosen the cable clamp. Draw the cable end coming from the film holder/image receptor through the opening in the ring.
  4. Pull off plug K9. Loosen the cable clamp. Unscrew the X-ray tube assembly. Unscrew the shielding eye on plugs **K3** and **K9** from the ring. Draw plugs **K3** and **K9** together with the ring cable through the opening on the X-ray tube assembly out from the ring (the ring cable is no longer required)
- 
- Install the new ring cable
  - 5. Rotate the X-ray tube assembly mounting bracket into the left position.
  - 6. Draw the new ring cable with the unit-end plug connections through the opening on the X-ray tube assembly to the inside of the ring. Order of the plug connections: X6, → X7, → X2, → X4, → X5, → ground wire, → X2, → X3.
- Danger of damaging the unit-end plug connections.
  - Place the long cable end over the ring.

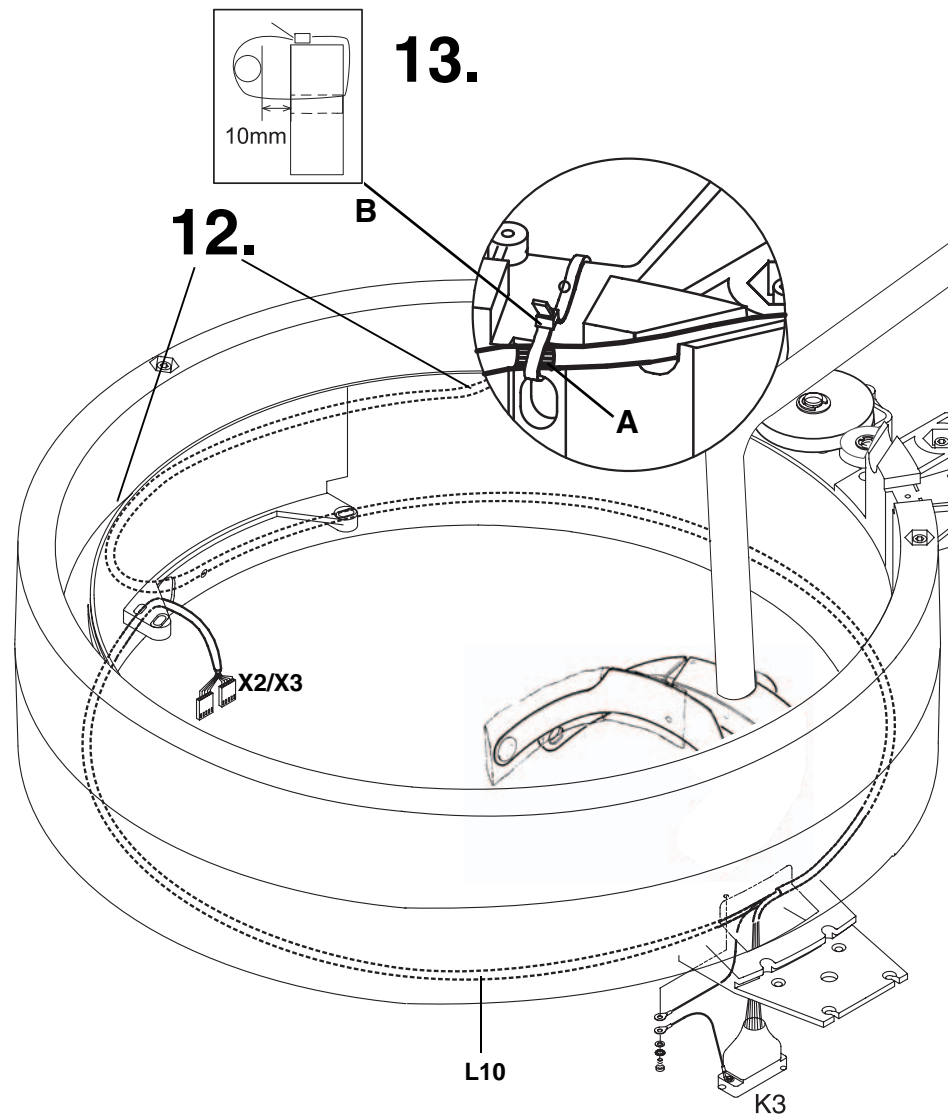
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## 6.16 Replacing ring cable L10



7. Align plugs **K3** and **K9** for the X-ray tube assembly and screw the 2 grounding eyes (black and copper-colored) onto the ring. Attach the X-ray tube assembly with the screws. Push plug **K3**, do not pull on the cable!
8. Place the shielded cable (X2, X3) in the ring and draw the plugs X2, X3 through the opening in the cassette holder/sensor holder until the hexagonal sleeve projects approx. 20 mm.
9. Insert the main strand of the ring cable into the ring as illustrated.
10. Rotate the ring carefully to the right, thus guiding the ring cable underneath light barrier **C**.
11. Carefully pull the ring cable out of the ring behind the light barrier using a pair of tweezers.
12. Grease the ring cable in this area with the grease included.
  - **Be careful** that no grease gets on the flat belt.
13. Insert the unit end of the ring cable into the recess in the ring and fix it with a cable tie **B** at mark **A**. The cable tie on the ring must have approx. 10 mm play.
14. Refit plug connections, shields and ground wires on the unit end and fix everything with cable ties.



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## 7 **Maintenance**

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# Maintenance

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### Measurements



#### **DANGER**

***Shock hazard! It is essential that you switch the X-ray unit OFF before replacing any components!***

***The unit must be disconnected from the junction box of the building installation before replacing any parts near the power supply, power switch, board DX 32 or the X-ray tube assembly!***



#### **CAUTION**

- Switch the X-ray unit OFF before connecting a measuring instrument.
- Select the correct current/voltage type and adjust the measuring range to match the expected readings.
- Perform continuity tests only on units which are switched off.
- Observe the prescribed cool-down intervals if several exposures must be taken to check a measurement.



#### **CAUTION**

***Please observe the usual precautionary measures for handling boards (ESD).***

***Touch a ground point to discharge static electricity before touching any boards.***



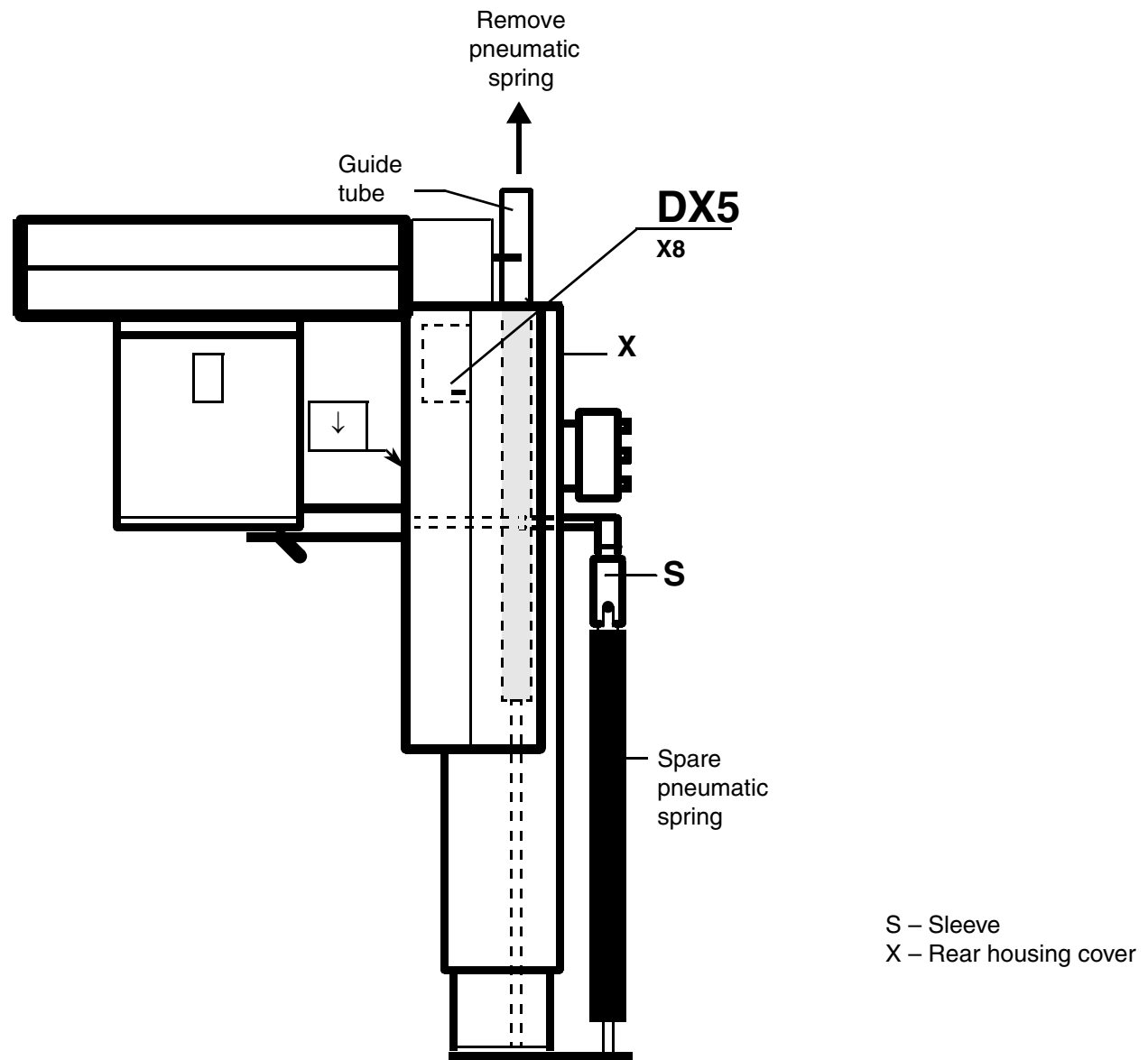


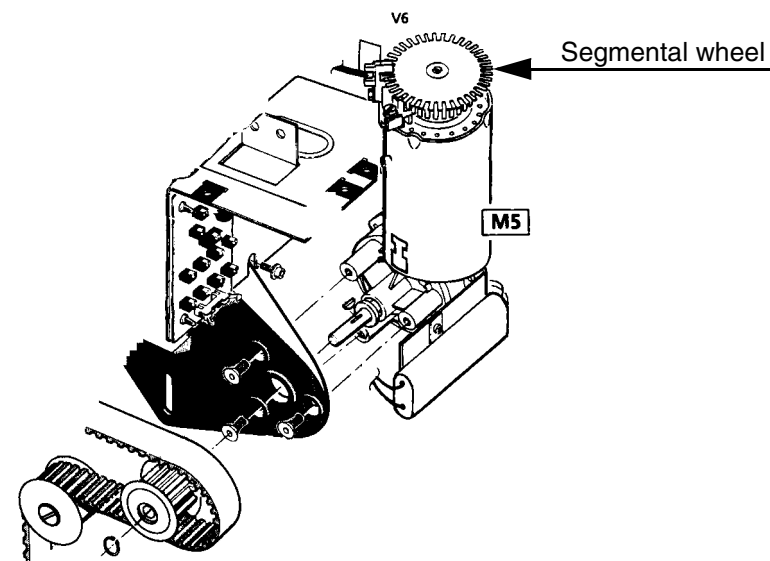
Fig. 1: Pneumatic spring

### Check whether the height adjustment causes atypical running noises:

- Move the unit up and down through its entire adjustment range.

The following running noises may then occur:

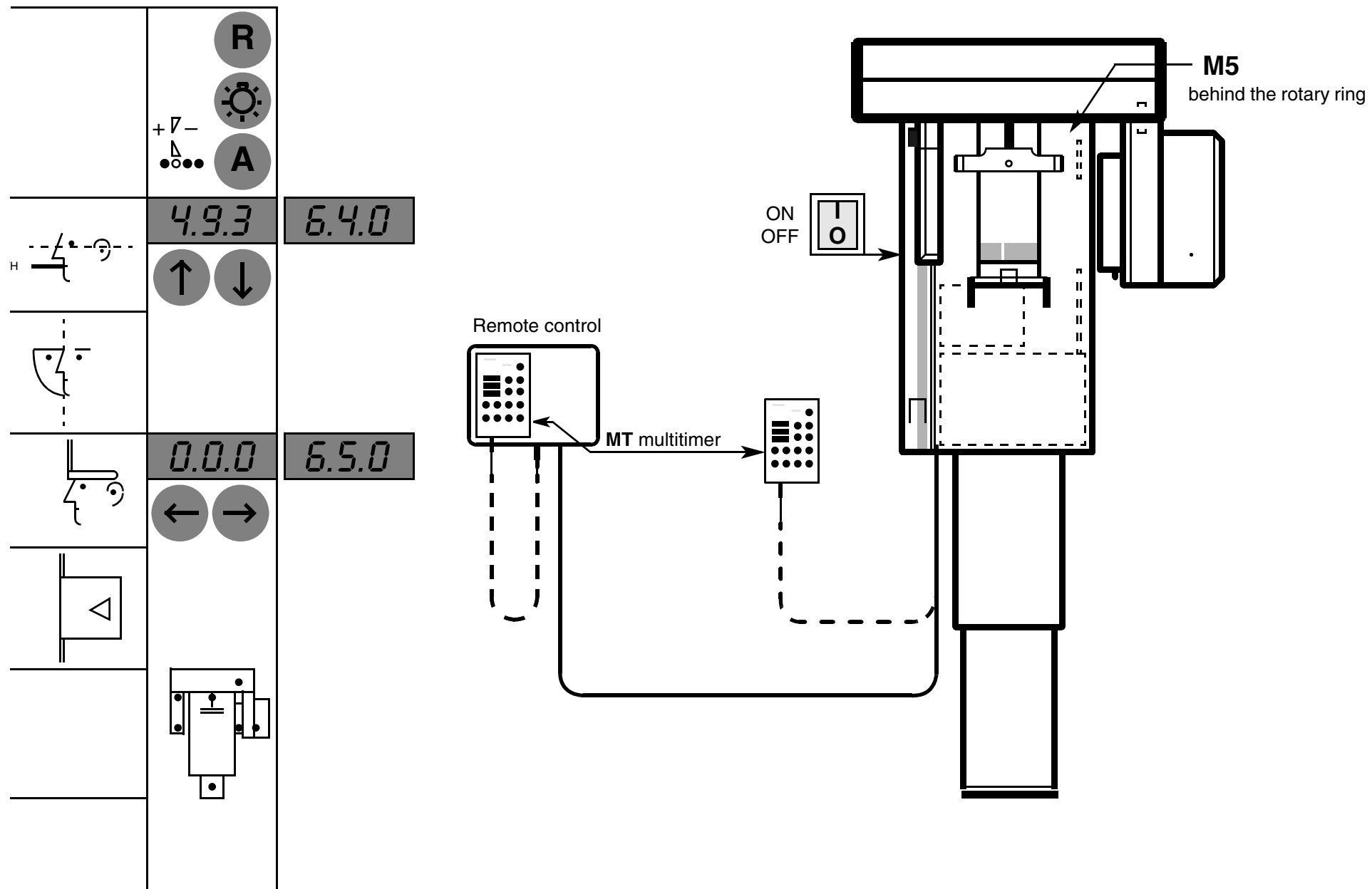
- Repetitive, knocking noises which occur depending on the speed of adjustment.  
The segmental wheel is obstructed.  
☞ See Chapter 7.17 - Checking light barrier housings V2 to V8/ring cable.
- Knocking, hammering noises.  
The belt slips or the toothed roller slides because the belt is too loose.  
Tighten the belt.  
☞ See Chapter 6.4 - Replacing the height adjustment motor M5.
- Squeaking of the pneumatic spring.  
Replace the pneumatic spring.  
☞ See Chapter 6.1 - Replacing the gas-operated spring.
- Heavy, hammering bearing noises in the column which influence the synchronism of the unit.  
Consult with the plant and replace the unit if necessary.



*Continued on next page*

Fig. 2: Noise sources

## 7.1 Checking the height adjustment





Continued from previous page

### Check whether height adjustment is possible without jolting:

- Move the unit above height position 300 using the fine positioning control.

If height adjustment without jolting is not possible, set the height adjustment:

- ☞ See Chapter 3.24 - Correcting error of message E3 09: Pulses for height adjustment are not within allowed time..
- ☞ See Chapter 3.25 - Correcting error of messages E3 10, E3 11: Count for height adjustment too high/too low for reference setting..

If height adjustment without jolting still is not possible, replace the pneumatic spring:

- ☞ See Chapter 6.1 - Replacing the gas-operated spring.

### Check whether the correction switch for the height adjustment is functioning reliably:

- Move the unit through its entire height adjustment range while observing the height display.

If the height displayed differs from the actual height of the unit or a numerical jump occurs in the center of the height adjustment range, adjust using the height correction switch:

- ☞ See Chapter 4.14 - Adjusting the correction switch for height adjustment.

### Check whether the acoustic signal can be heard during height adjustment:

If no acoustic signal is audible, replace and adjust PCB DX1:

- ☞ See Chapter 4.13 - Adjusting board DX1.

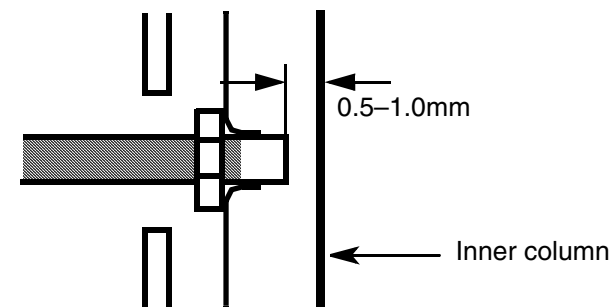
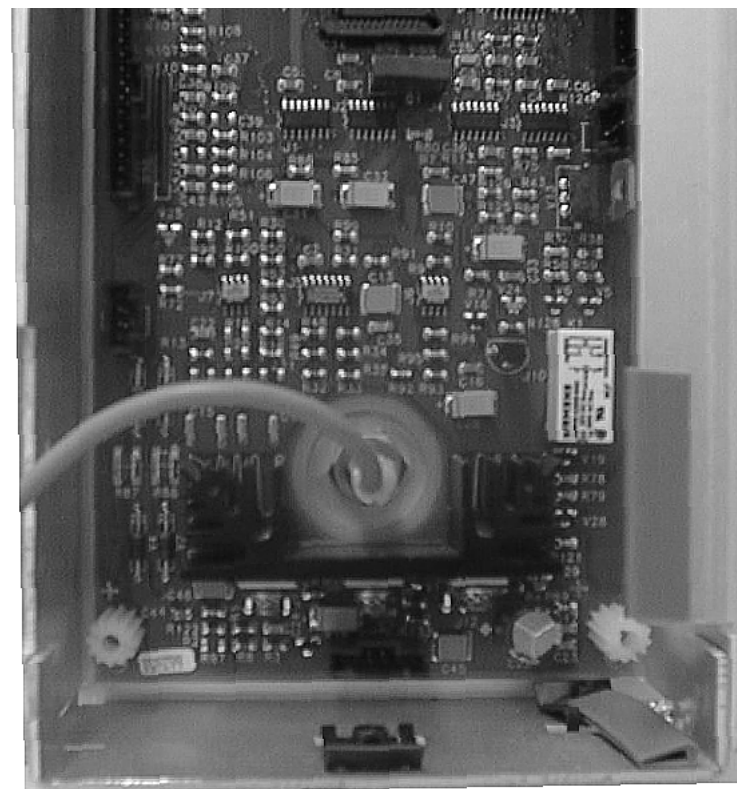
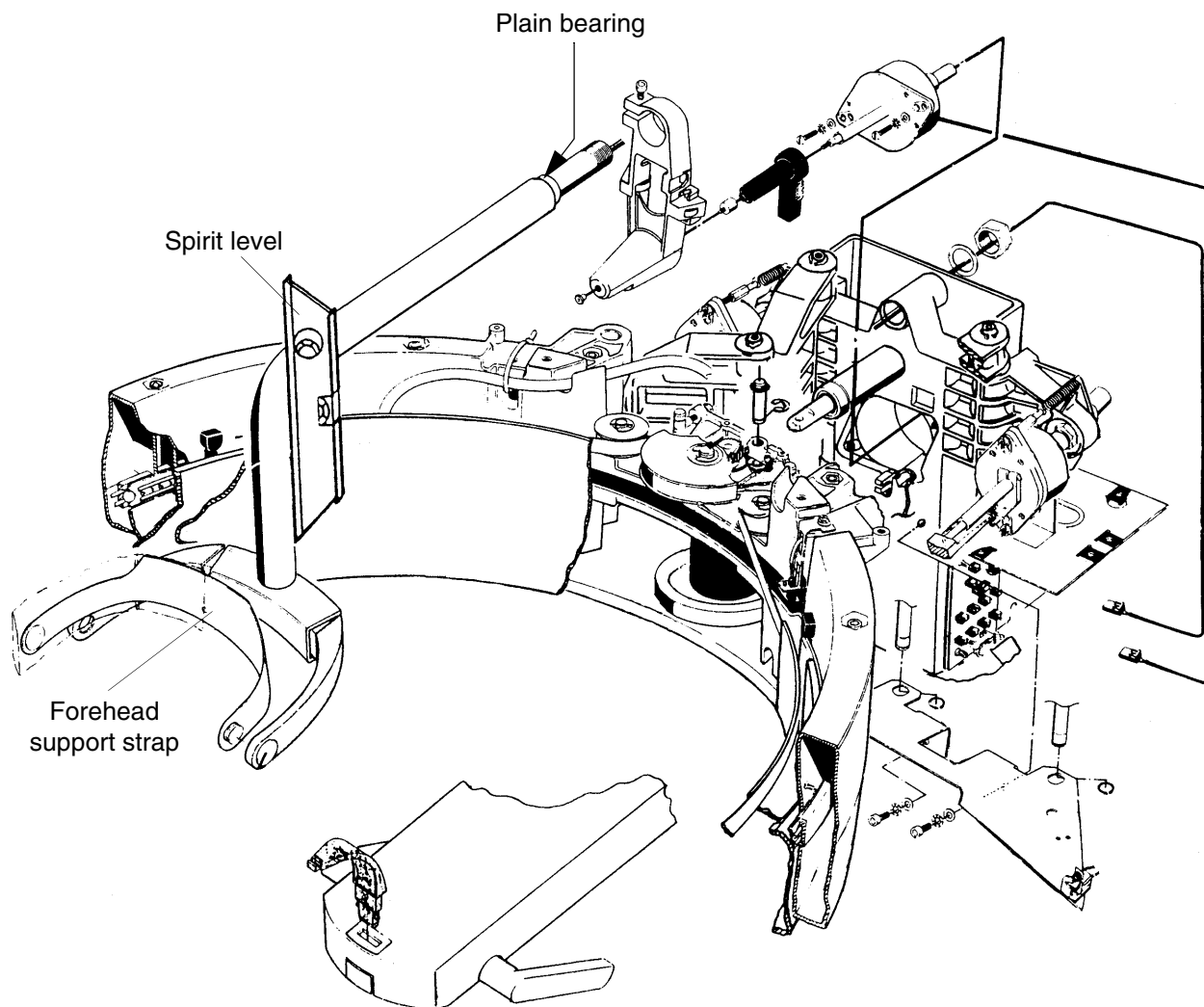


Fig. 4: Height correction switch

## 7.1 Checking the height adjustment



**Fig. 5: Forehead support**

### Check the forehead support to make sure that it is mounted vertically:

- Place a spirit level against the tube bend of the forehead support. 🖐 See Fig. 5: Forehead support.
- Check for a distance of 32mm between the tube bend and the image receptor and of 30mm between the tube bend and the cassette.

If the forehead support is not mounted vertically or the distance is not correct, adjust the forehead support:

🖐 See Chapter 6.5 - Replacing the forehead support and/or the forehead support motor M6.

### Check the forehead support for easy and jolt-free movement:

- Move the forehead support through the entire range.

If the forehead support cannot be moved easily and without jolting, grease the plain bearing with conventional vaseline.

### Check whether the temple supports can be adjusted symmetrically:

- Rotate the adjusting knob for the temple supports while observing the position of the temple support arms.

If the temple supports cannot be adjusted symmetrically, replace forehead support.

🖐 See Chapter 6.5 - Replacing the forehead support and/or the forehead support motor M6.

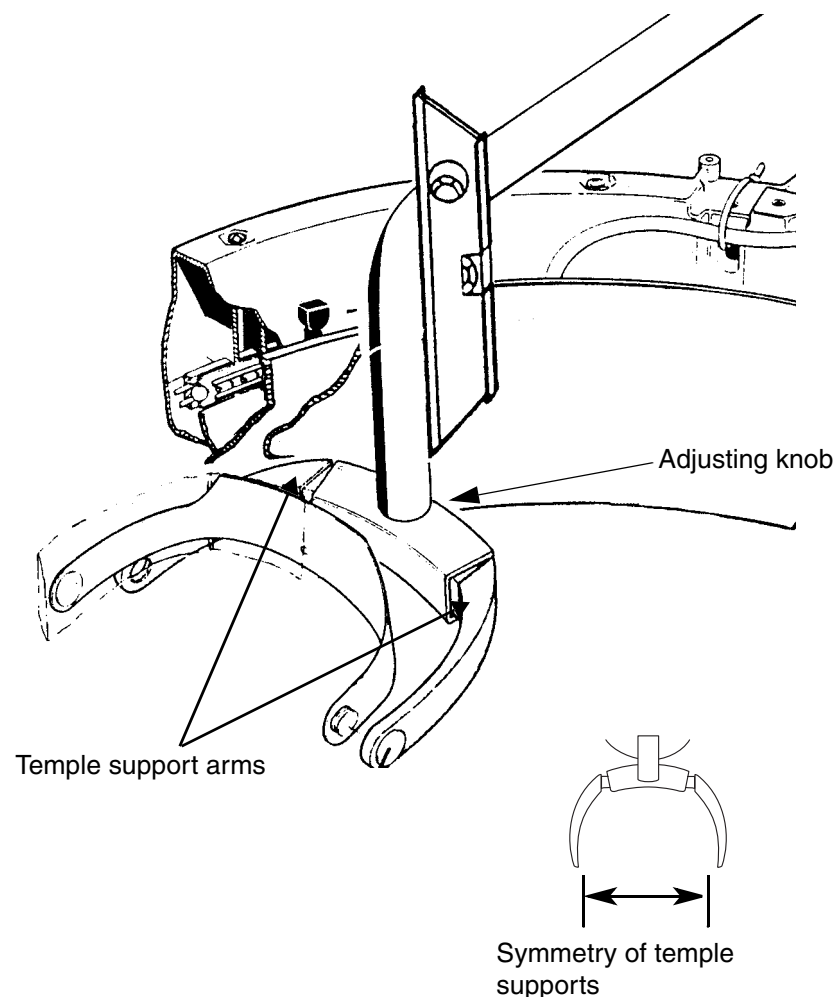


Fig. 6: Adjusting the temple supports

## 7.2 Checking the forehead support

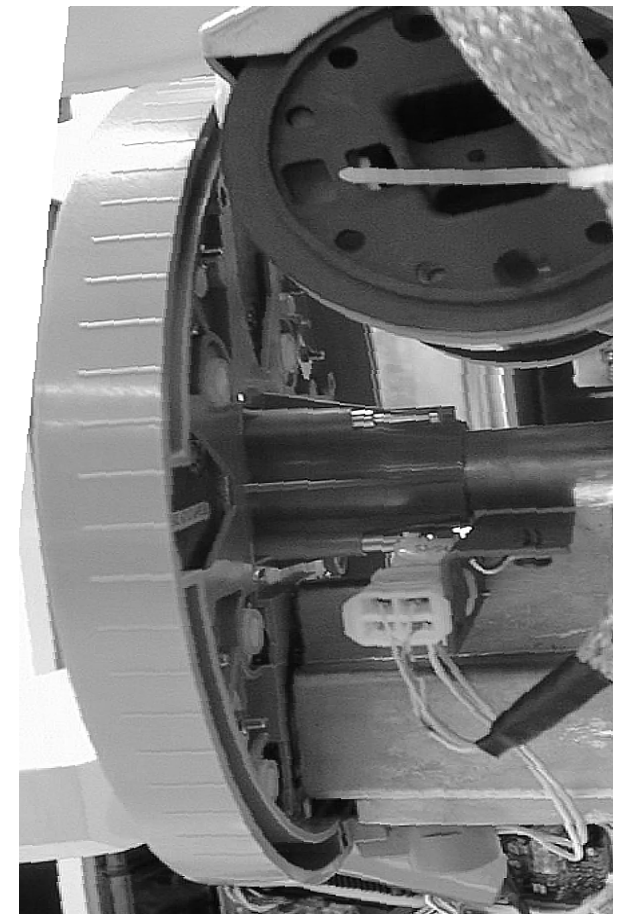
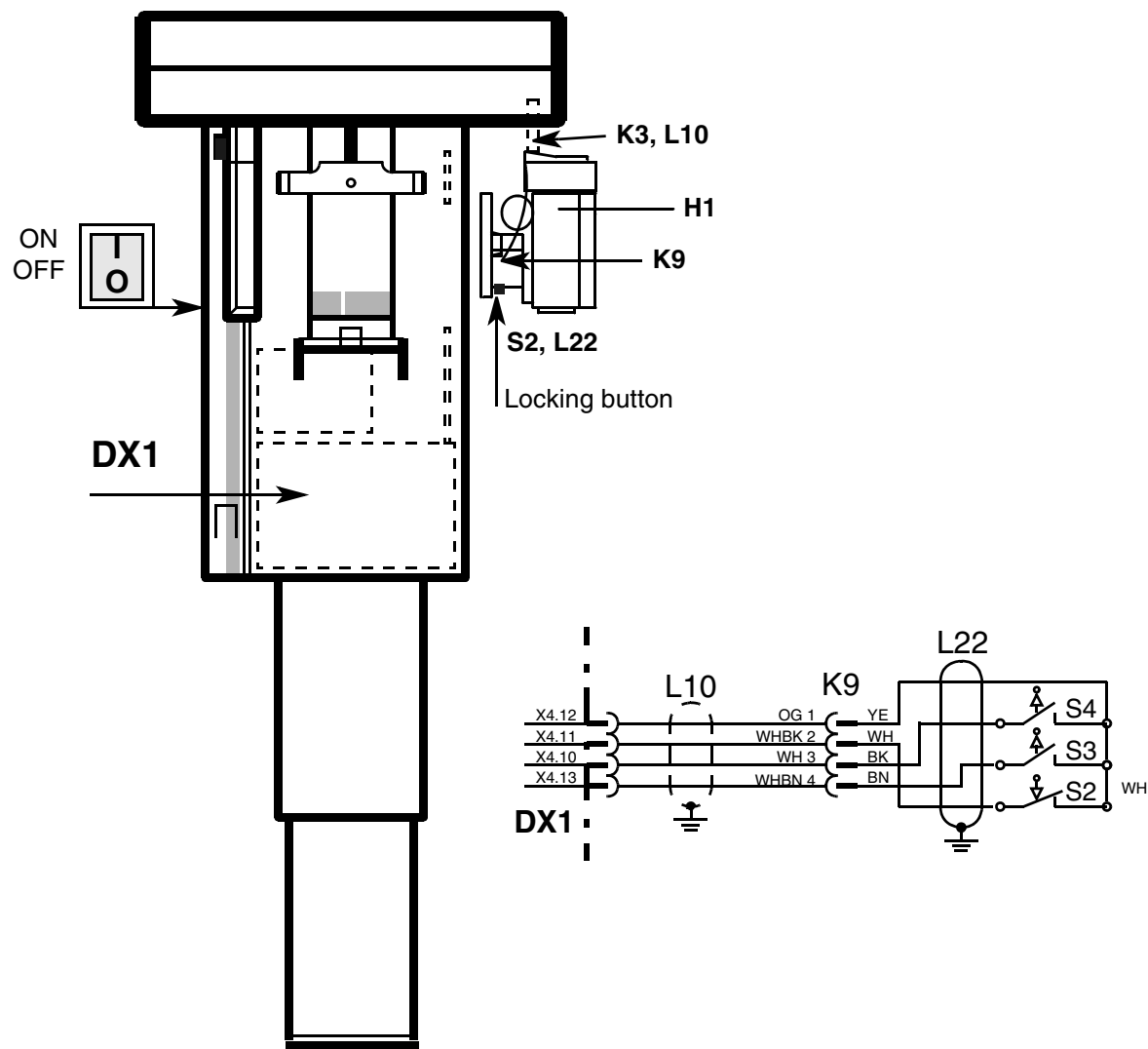


Fig. 7: Diaphragm switch

### Check the diaphragm wheel to make sure that it can be rotated and engages securely:

- Press locking button briefly and turn diaphragm wheel until it engages.

The diaphragm number appears at the top right of the diaphragm window.

☞ See Fig. 8: Diaphragm wheel.

If the diaphragm wheel cannot be turned or does not engage, check it:

☞ See Chapter 3.4 - Correcting errors of help messages H3 05 and H3 06.

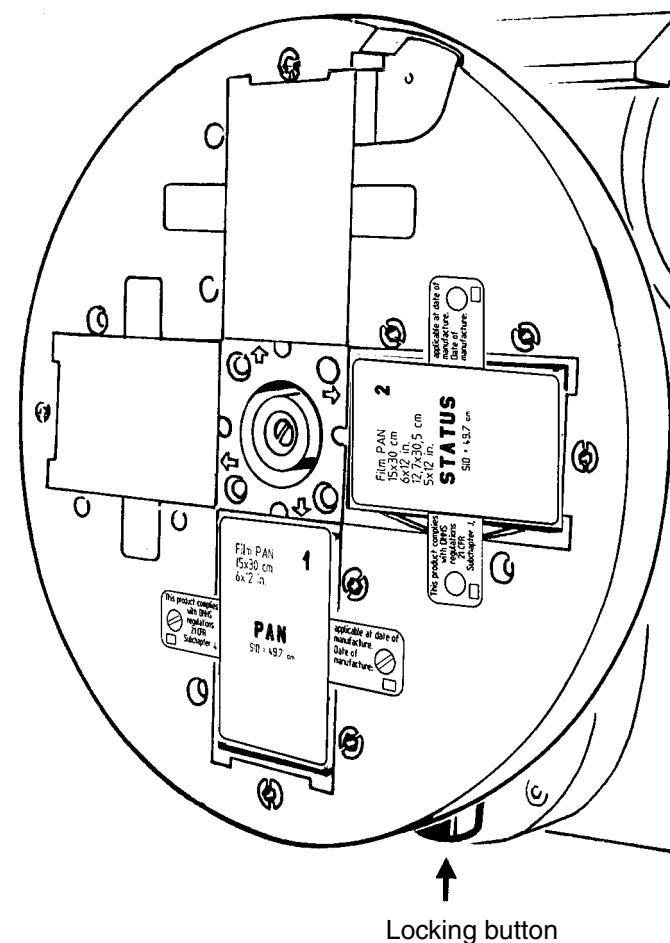


Fig. 8: Diaphragm wheel

## 7.3 Checking the diaphragm wheel

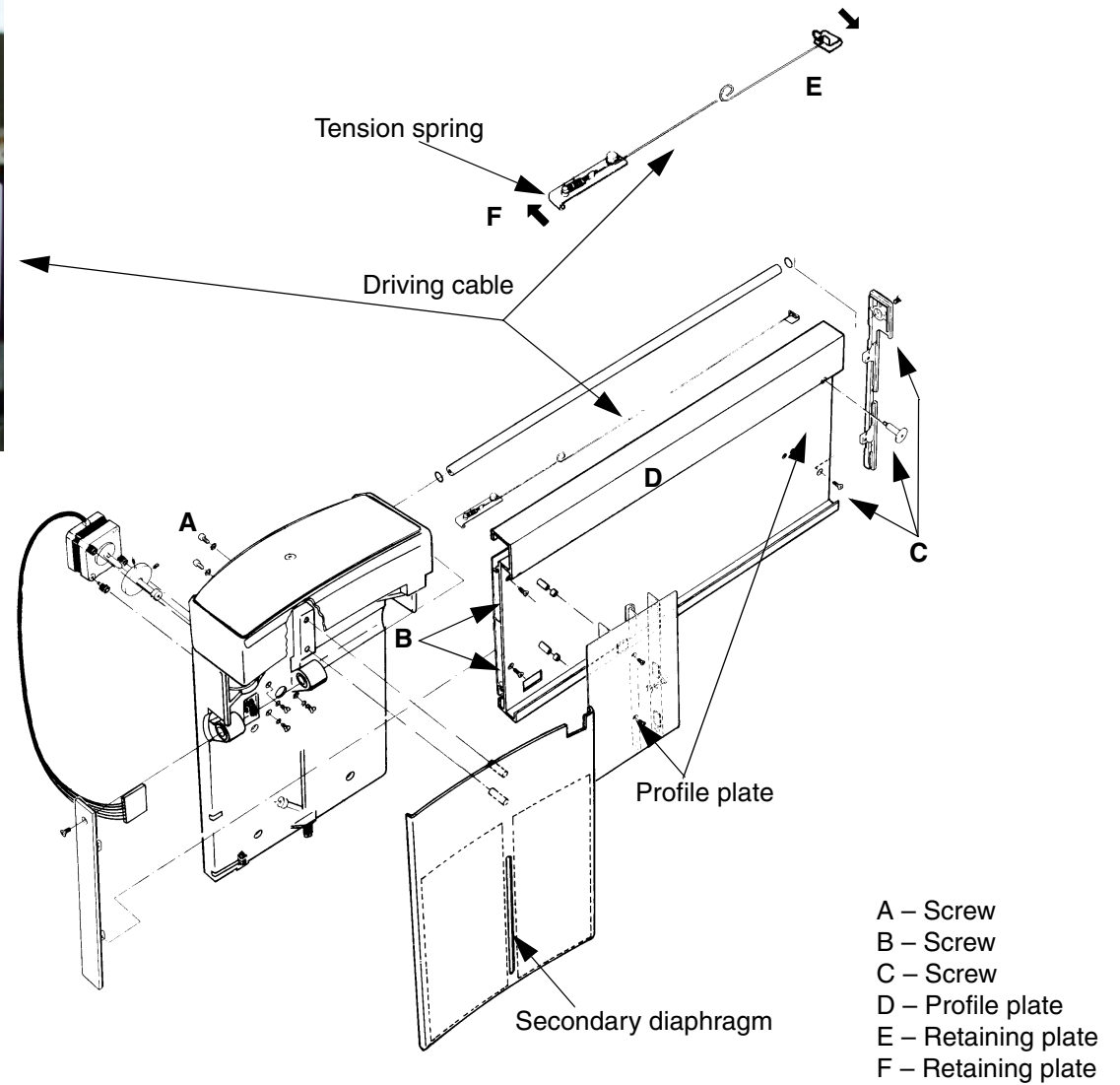
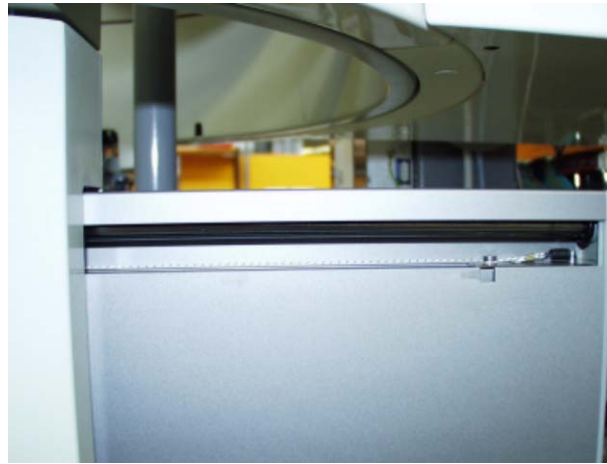


Fig. 9: Position of cassette holder driving cable

### Check whether the film cassette is detected:

- Insert the film cassette.

If the film cassette is not detected and help message H3 02 appears on the multimer display, check the cassette holder:

☞ See Chapter 5.15 - Service routine S.16 Film holder service.

### Check whether the cassette holder engages securely in both end positions:

- Swivel the cassette holder in and out.

☞ See Fig. 10: Cassette holder with swiveling movement.

- Check whether the restoring spring snaps the cassette holder into the end position securely.

If the cassette holder is not locked in place, grease the travel track with “Longtime TD2” and check for mechanical wear and tear. Replace the cassette holder if necessary.

### Check the cassette holder driving cable to make sure it is not damaged:

- Perform visual check of driving cable to determine whether it is stretched, spliced or damaged.

☞ See Fig. 9: Position of cassette holder driving cable.

If the driving cable shows any signs of damage, replace it:

☞ See Chapter 6.11 - Replacing the rope and/or the cassette drive motor M4.

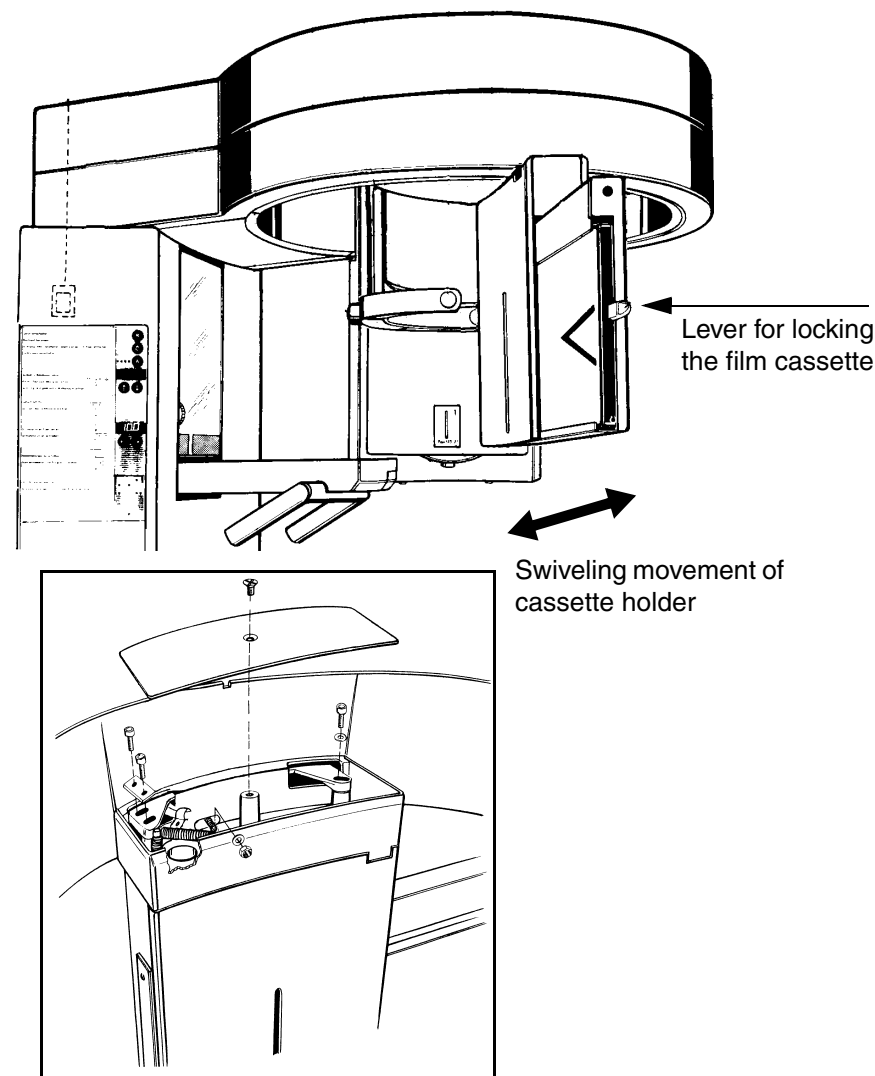


Fig. 10: Cassette holder with swiveling movement

## 7.4 Checking the cassette holder

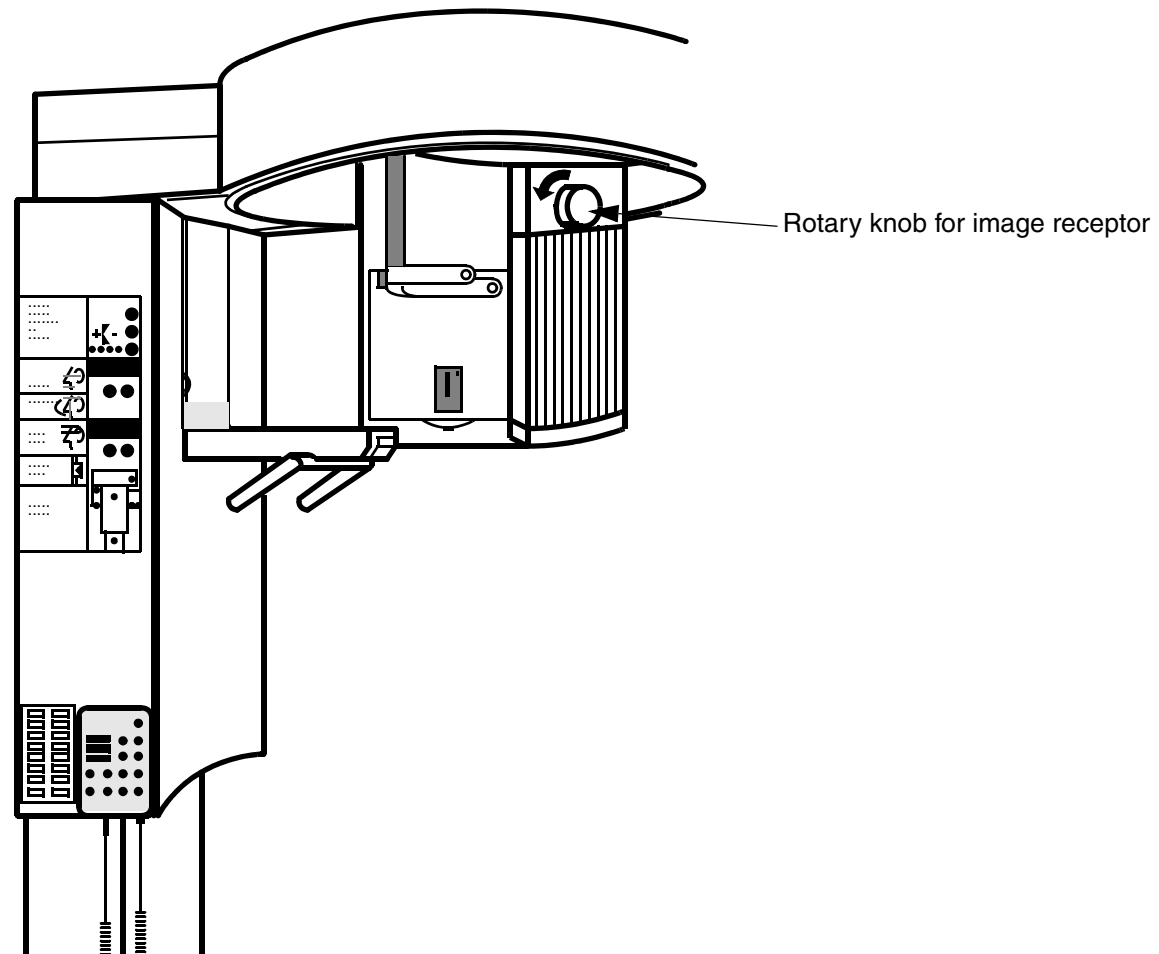


Fig. 11: Image receptor with rotary knob



**Check whether the image receptor can be screwed in and out easily and fits in the guide snugly:**

- Screw the image receptor in and out by turning the rotary knob. Make sure that the image receptor moves easily and without jolting.

☞ See Fig. 12: Rotary knob and sensor ejector.

If the image receptor cannot be screwed in and out easily or fits into the guide too loosely, check whether the teeth on the rotary knob or the sensor ejector are broken. Replace any damaged parts:

☞ See Chapter 6.15 - Replacing rotary knob and sensor ejector.

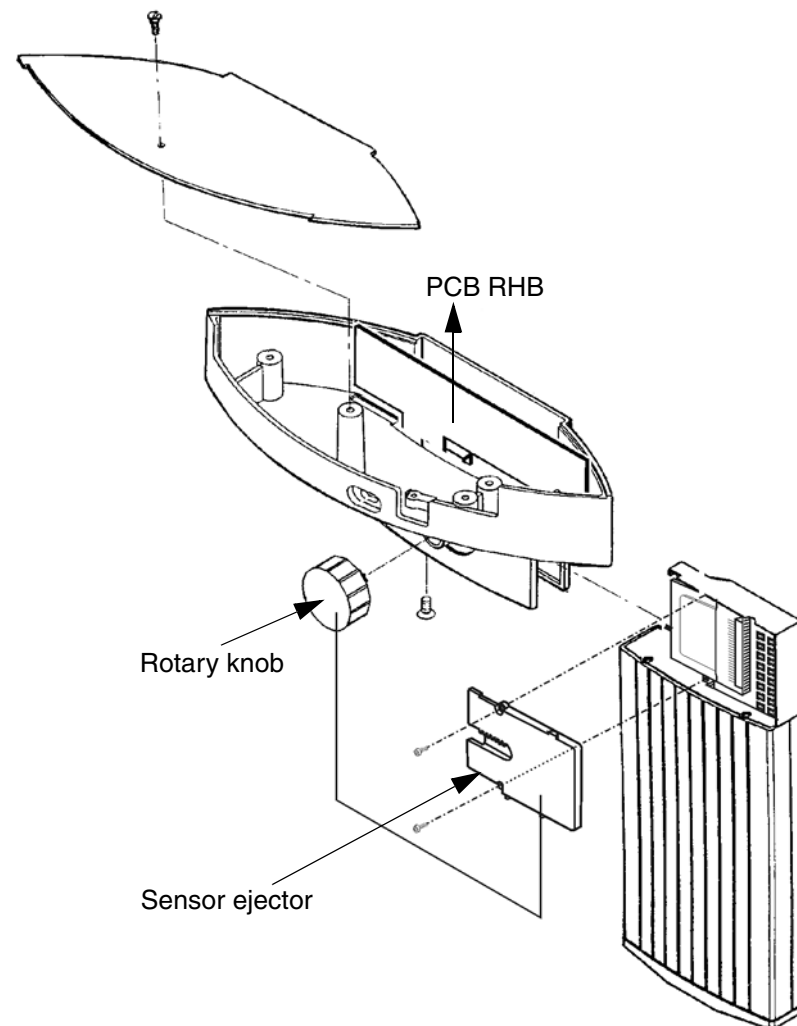


Fig. 12: Rotary knob and sensor ejector

## 7.5 Checking the image receptor

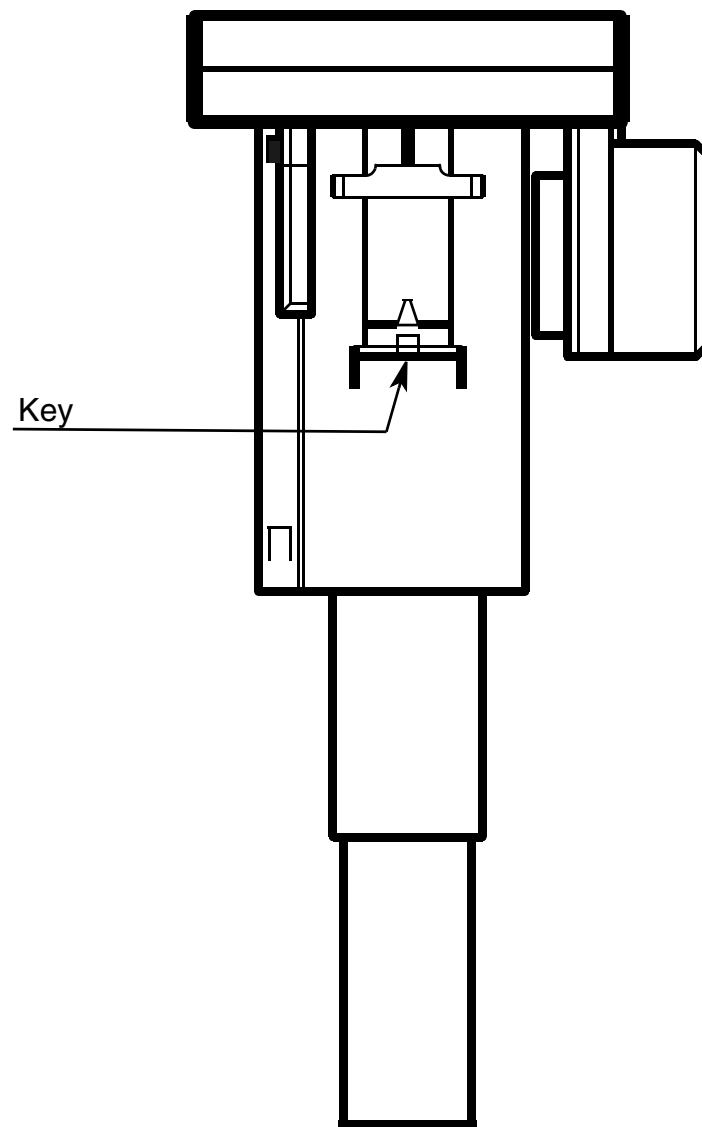


Fig. 13: Key for bite block/contact segment/chin rest

**Check whether the bite block/contact segment/chin rest fits securely enough into the bite block holder:**

- Remove the bite block/contact segment/chin rest from the bite block holder and reinsert it until it snaps into place.

The bite block/contact segment/chin rest must not be in a slanted position or fit loosely in the holder.

If the bite block/contact segment/chin rest can be moved too easily in the bite block holder, replace the key for the bite block/contact segment/chin rest:

☞ See Chapter 6.6 - Replacing the catch for the bite block/support segment.

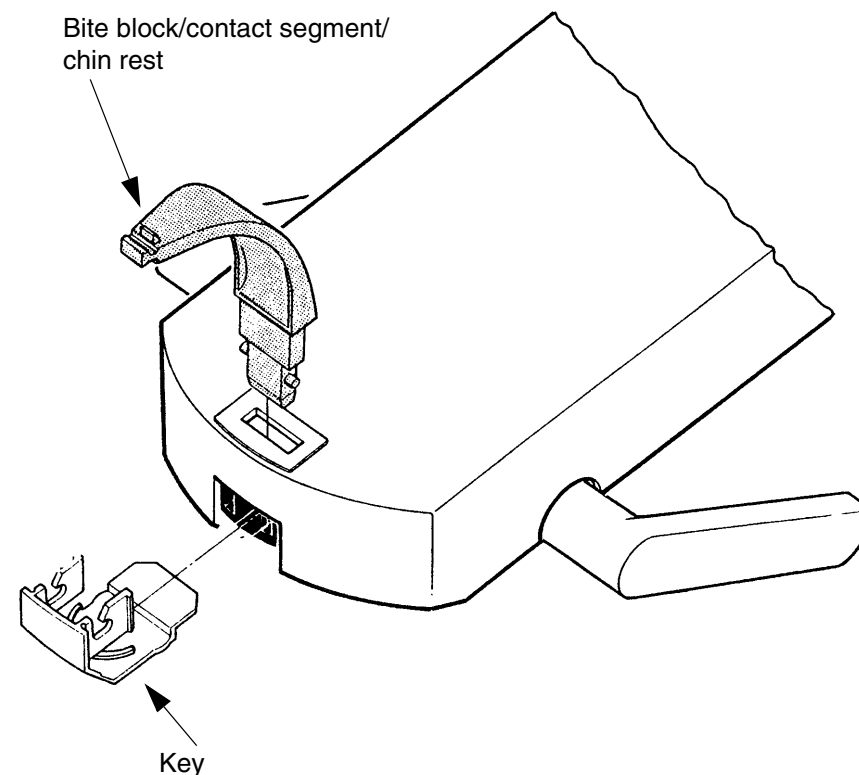
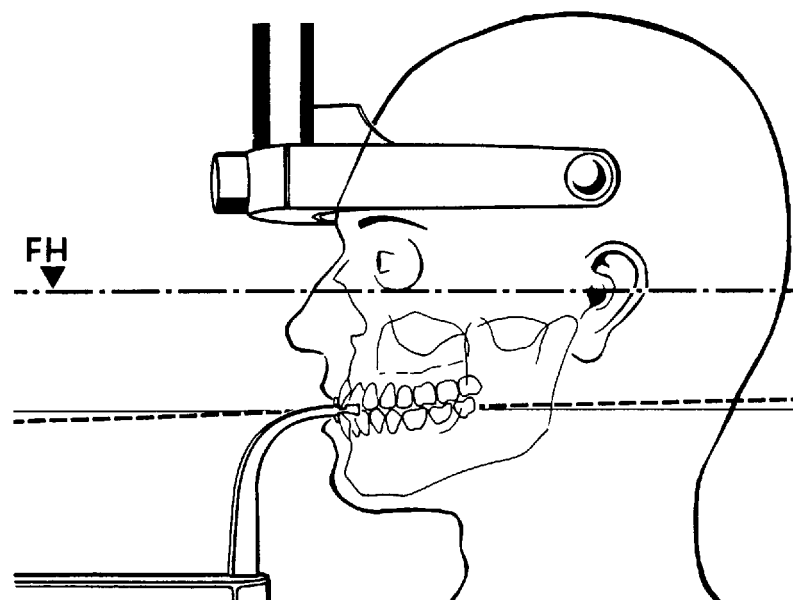


Fig. 14: Replacing the key for the bite block/contact segment/chin rest

## 7.6 Checking the bite block/contact segment/chin rest in the bite block holder



FH – Frankfort horizontal plane

Fig. 15: Adjusting the light localizer

**Check whether the light localizer can be adjusted:**

- Switch the light localizer on and adjust the height with the handwheel.
- If the light localizer cannot be moved flawlessly, replace the handwheel.

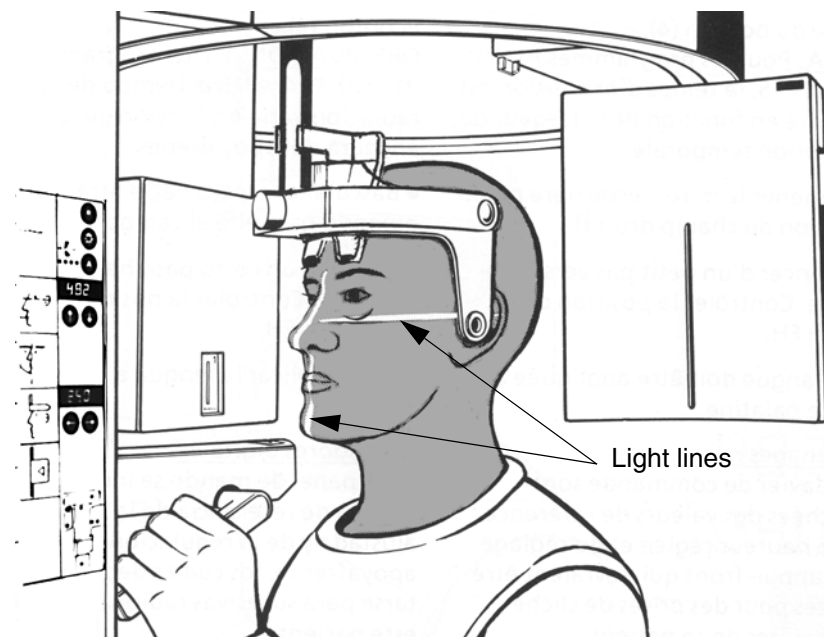


Fig. 16: Light localizer with light lines

## 7.7 Checking the light localizer

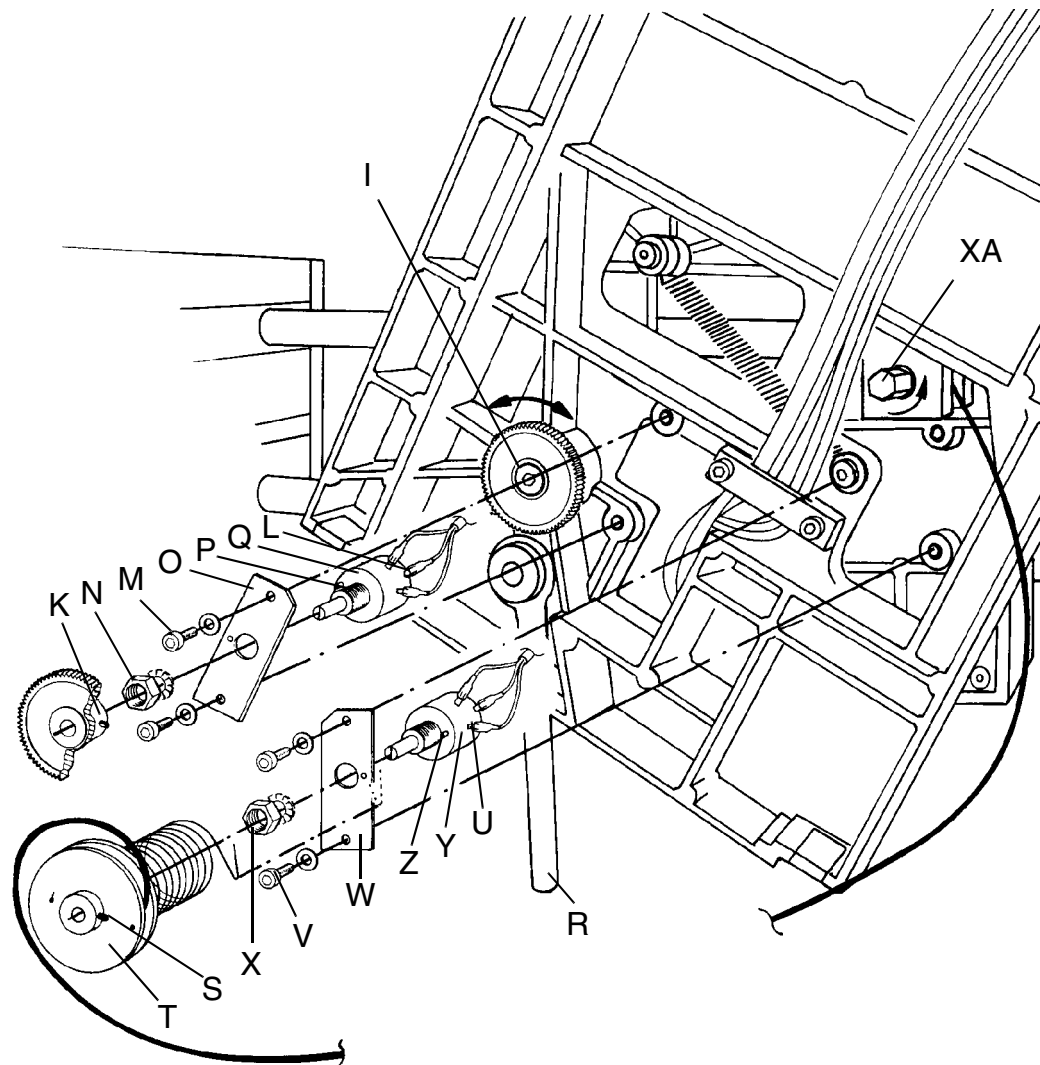
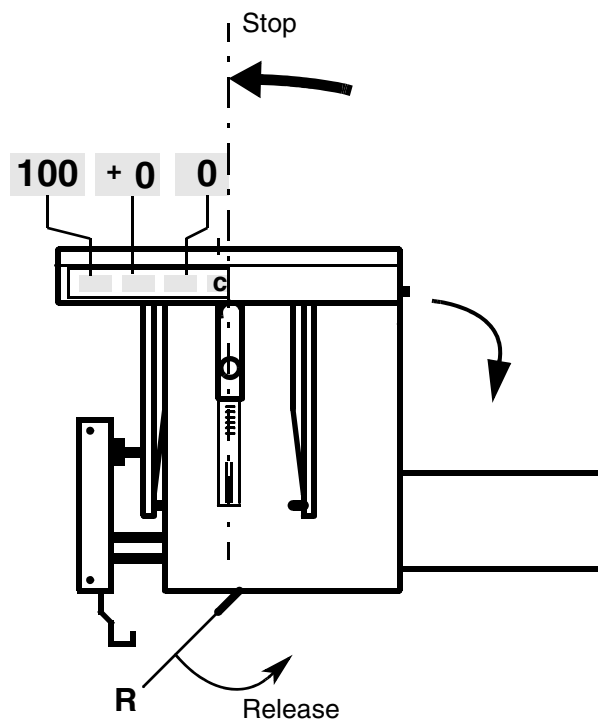


Fig. 17: Swiveling movement of cephalometer

### Check whether the cephalometer can be swiveled:

- Release locking lever **R**.
- Swivel cephalometer into 26° position and back to 0 position.
- Fasten locking lever **R**.

If a reading of **0** lights up on the digital display during the tilting movement, the zero position is correct.

If the cephalometer cannot be locked, adjust the locking lever.

☞ See Chapter 6.9 - Replacing/adjusting the sensor potentiometer of the Cephalometer Cephalometer model no. 15 38 177.

### Check whether the light localizer on the cephalometer is OK:

- Switch the light localizer on. To do this, first slide the cassette holder all the way out and then slightly to the right.

If the light cannot be switched on or no horizontal light line is visible, adjust the light localizer:

☞ See Chapter 6.8 - Replacing the lamp of the Cephalometer Cephalometer model no. 15 38 177.

### Check whether the head support can be swiveled:

- Loosen the locking screw. ☞ See Fig. 18: Head support can be swiveled
- Rotate the head support.

The head support must lock in place at 0°.

If the head support cannot be rotated or does not engage properly, check whether it is mechanically obstructed. Eliminate any mechanical obstacle and set the cephalometer, adjust the locking screw mechanically:

☞ See Chapter 4.8 - Checking and adjusting the ear olives Cephalometer model No 15 38 177.

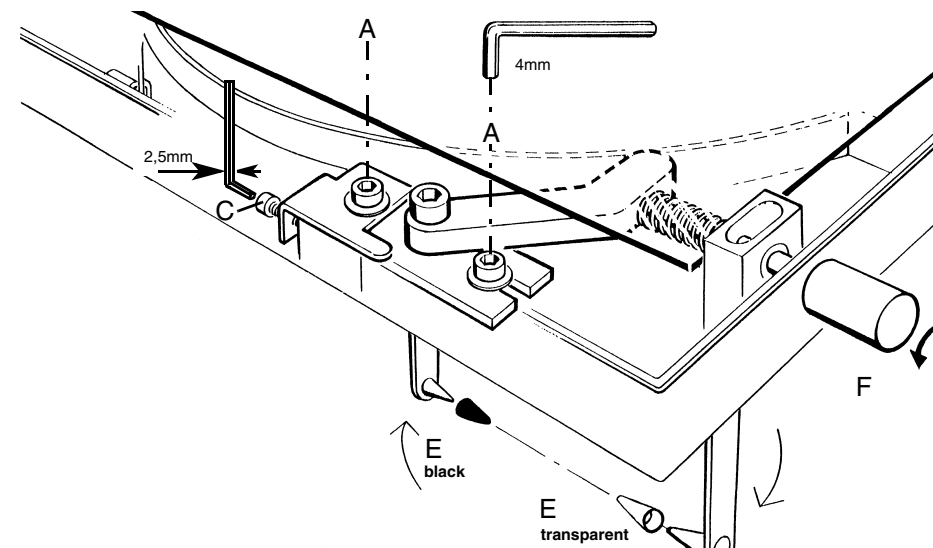
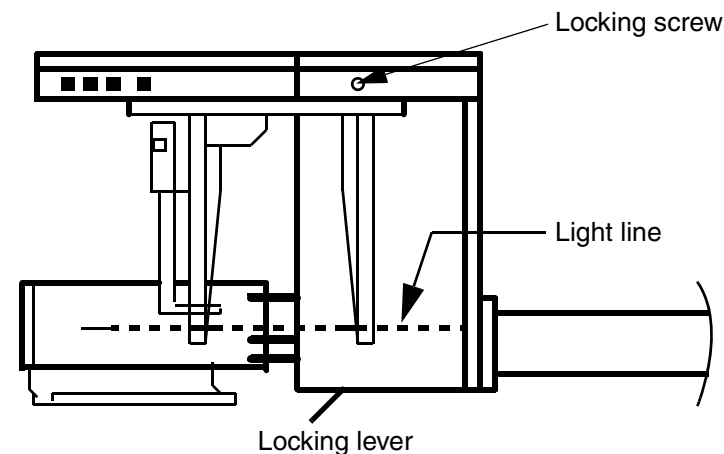
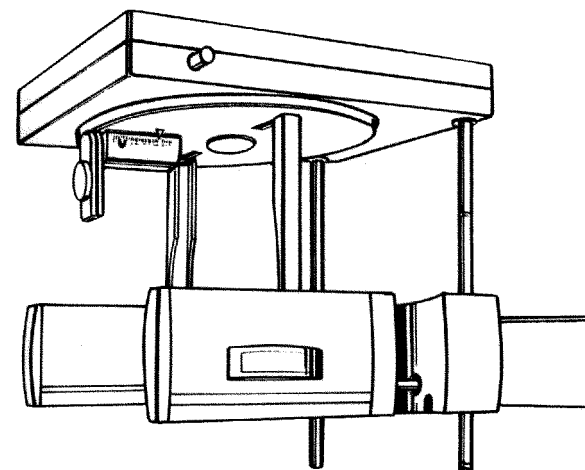
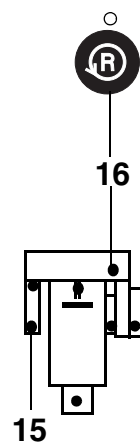
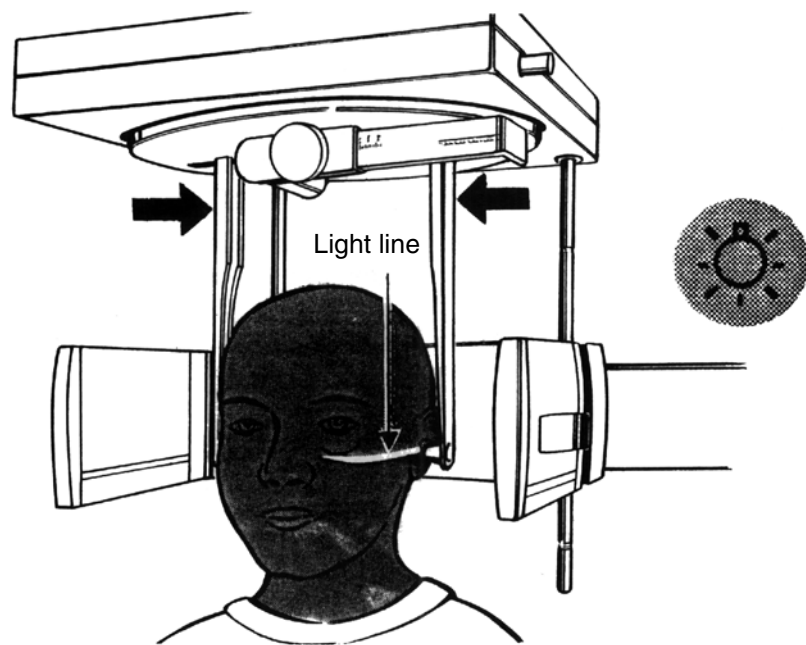


Fig. 18: Head support can be swiveled

## 7.8 Checking the conventional cephalometer



- 15 – Image receptor slot
- 16 – Position of X-ray tube assembly

Fig. 19: Light localizer on the cephalometer



### Check whether the image receptor can be screwed in and out easily and fits in the guide snugly:

- Screw the image receptor in and out by turning the rotary knob. Make sure that the image receptor moves easily and without jolting.

If the image receptor cannot be screwed in and out easily or fits into the guide too loosely, check whether the teeth on the rotary knob or the sensor ejector are broken. Replace any damaged parts:

☞ See Chapter 6.15 - Replacing rotary knob and sensor ejector.

### Check whether the light localizer on the cephalometer is OK:

- Switch the light localizer on by pressing the  key on the lateral control panel and check it.

If the light cannot be switched on or no horizontal light line is visible, check the lamp and replace the lamp if necessary:

☞ See Chapter 6.8 - Replacing the lamp of the Cephalometer Cephalometer model no. 15 38 177.

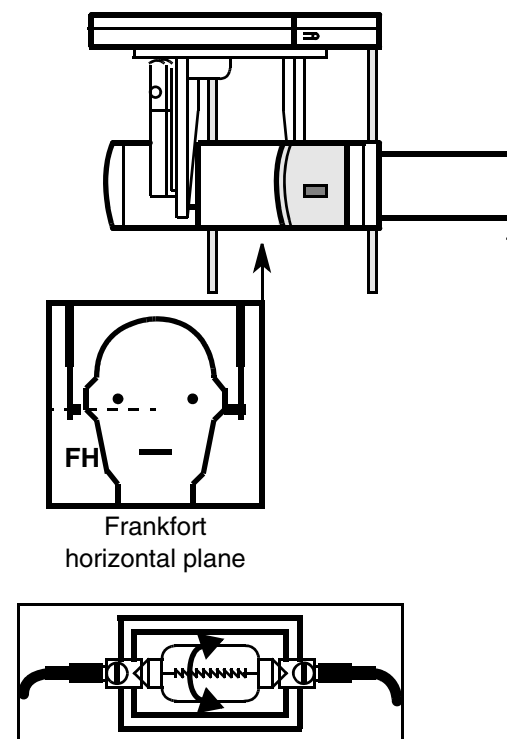


Fig. 20: Light localizer on the cephalometer

## 7.9 Checking the digital cephalometer

▼ Unexposed surrounding border ▼

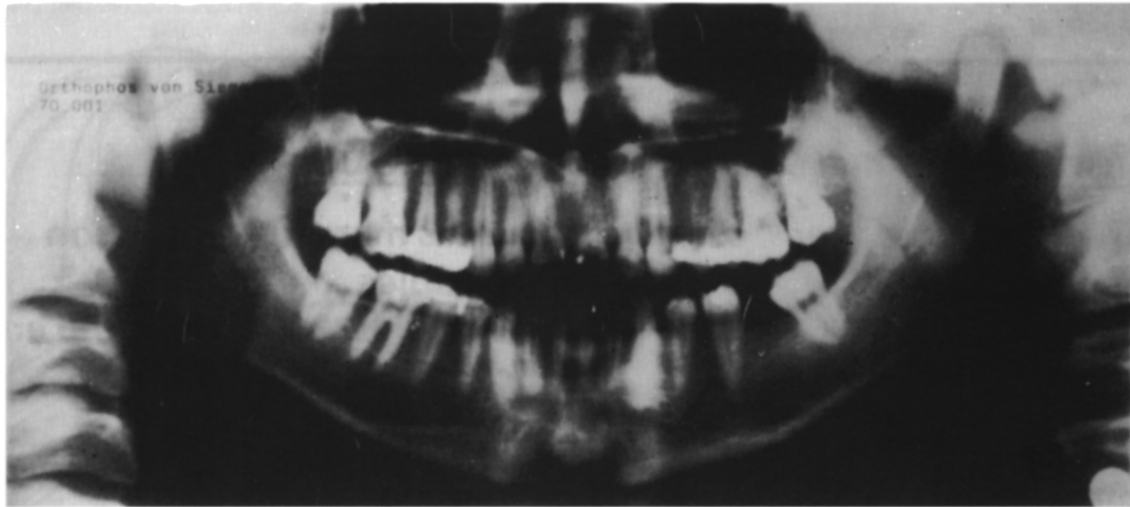





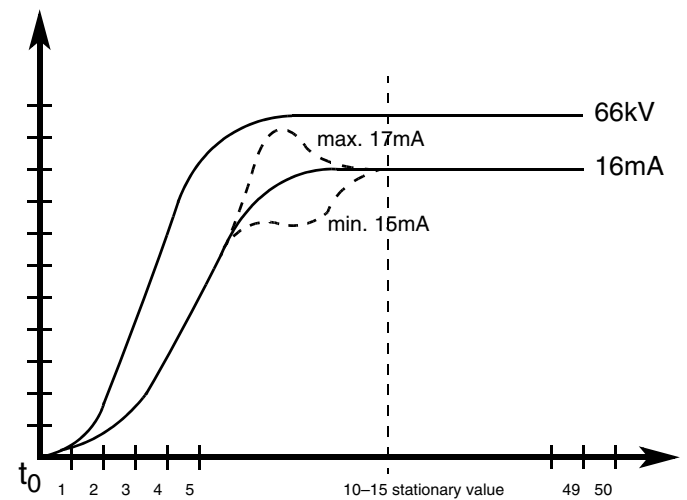
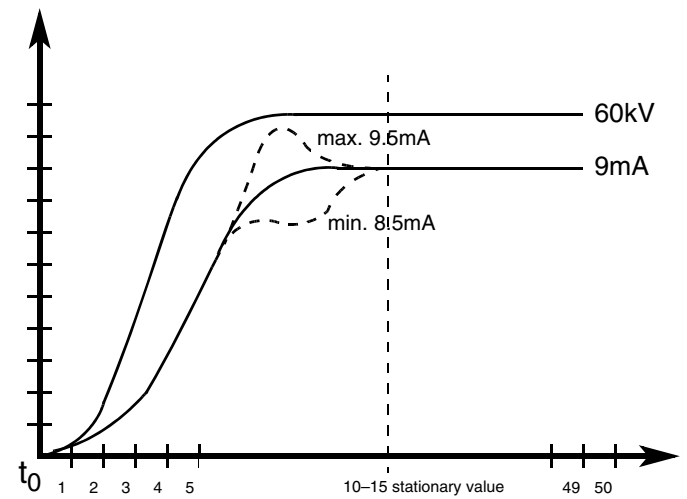
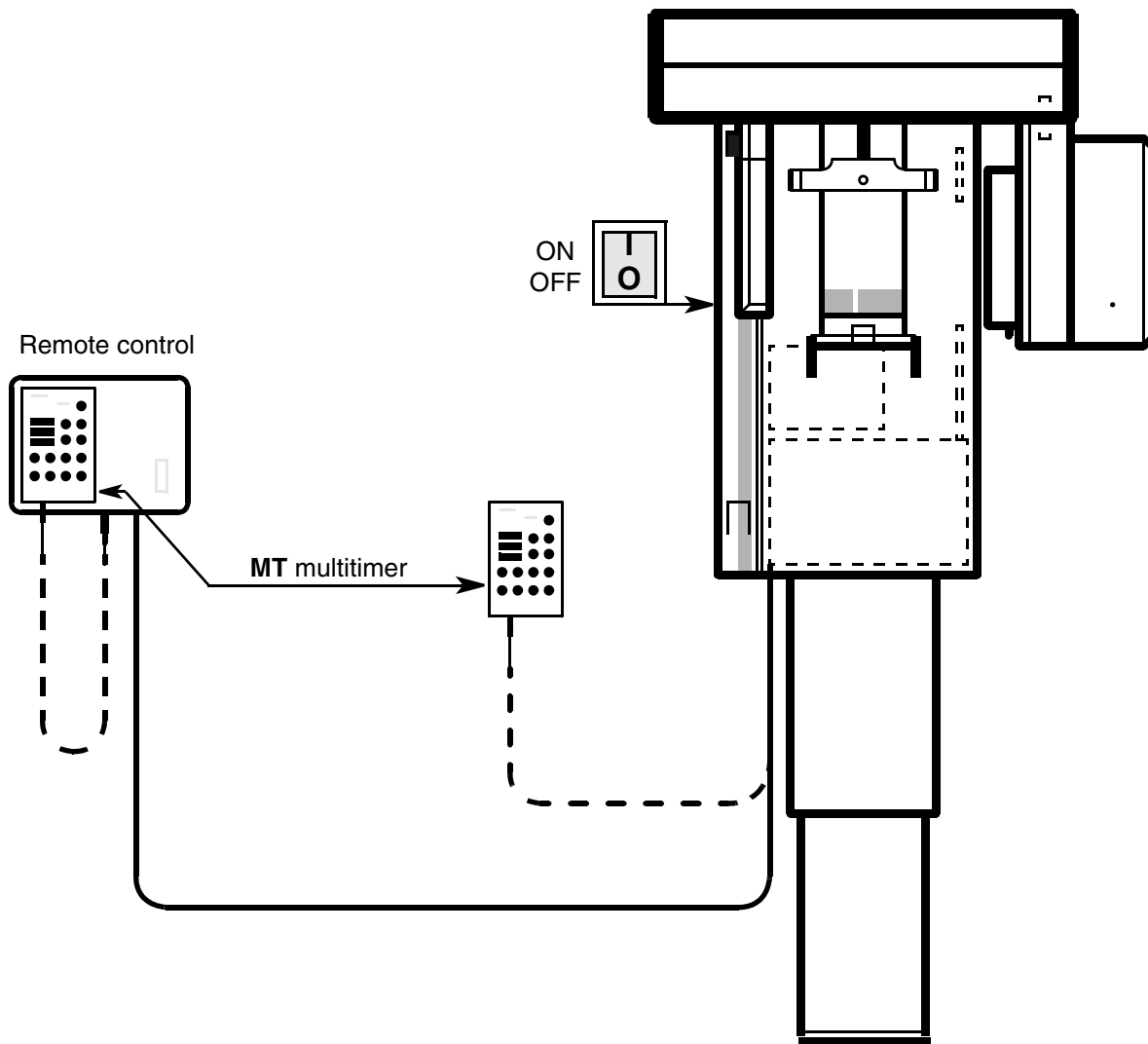
Fig. 21: Checking an exposure taken by the dentist

### Check whether existing exposures taken by the dentist are OK:

- Check existing exposures taken by the dentist for unexposed surrounding borders.  See Fig. 21: Checking an exposure taken by the dentist.
- Check whether the exposures show normal definition.
- Check whether the density of the X-ray image is OK.

If the quality of the exposure is unsatisfactory in any way, compare the selected exposure settings with the ones specified in the Operating Instructions and check the diaphragm if necessary:

-  See Chapter 7.12 - AES/phantom/needle phantom exposure with ORTHOPHOS Plus/Plus Ceph.
-  See Chapter 7.13 - Phantom/needle phantom exposure with ORTHOPHOS Plus DS/Plus DS Ceph.



50 measurements at a capture interval of 2ms

Record measurements point-by-point to check transient response.

Fig. 22: Capture intervals for kV/mA values

### **Check whether the actual kV/mA values and the preheating are correct:**

- Select service routine S.04 and check the actual kV/mA values.

If the actual kV/mA values and/or the preheating are not within tolerance, readjust the kV/mA values and the preheating:

👉 See Chapter 5.7 - Service routine S.05 Heating adjustment.

## **7.11 Checking the actual kV/mA values and the preheating**



**Fig. 23: Needle phantom exposure and phantom exposure**

**Check whether the AES settings are OK:**

- Select service routine S.26.
    - ☞ See Chapter 5.24 - Service routine S.26 Checking and adjusting AES (Automatic Exposure Preselection).
- If the values listed on the phantom do not appear, perform the X-ray beam adjustment once again carefully:
1. Turn the diaphragm slightly, i.e. one stop position at the most.
  2. Find the maximum voltage value by adjusting the diaphragm.
  3. Repeat the phantom exposure until the correct value is set.
- ☞ See Chapter 4.2 - Checking and adjusting the X-ray beam for panorama radiograph.

**Check whether the phantom exposure is OK:**

**Radiation will be released.**  
**Observe the radiation protection guidelines.**

*Use the same type of film as is used by the operator in the practice!*

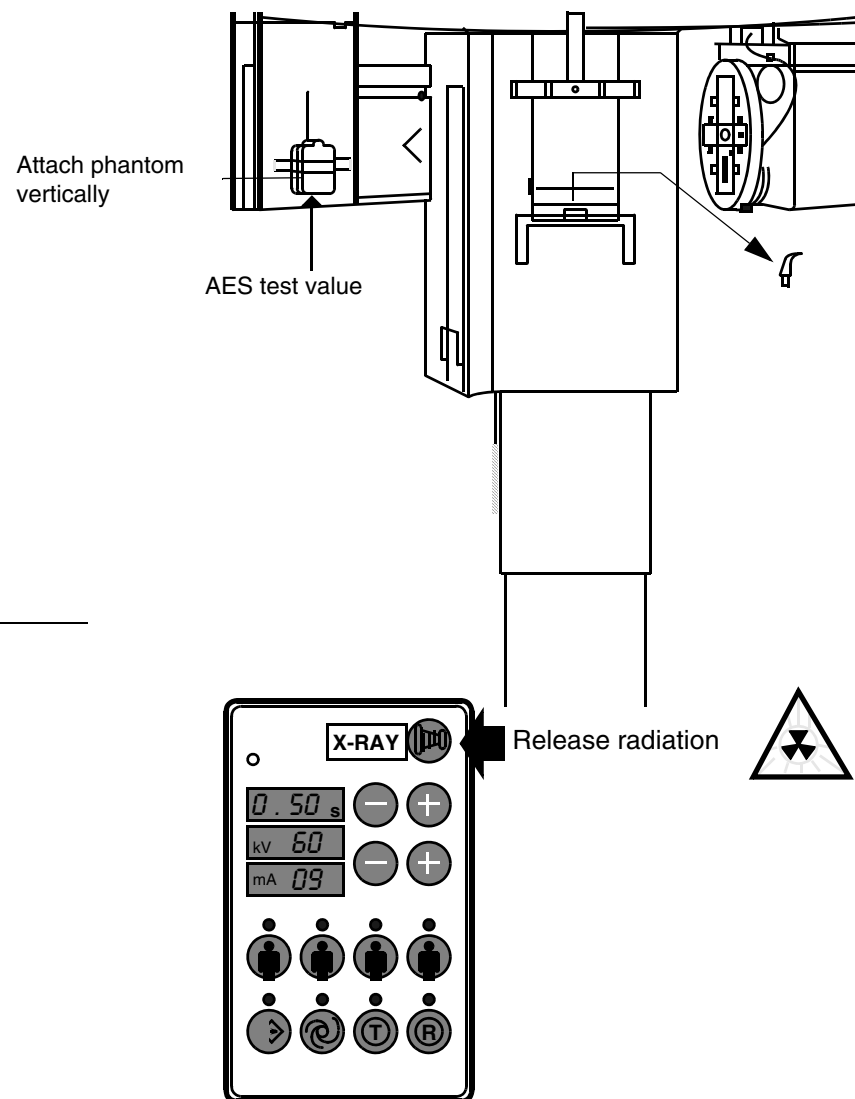
- Take a phantom exposure.

The density stripes produced on the film by the phantom must be parallel. No recognizable peaks should occur.

If the phantom exposure is not correct, check the X-ray beam adjustment:

- ☞ See Chapter 4.2 - Checking and adjusting the X-ray beam for panorama radiograph.

*Continued on next page*



**Fig. 24: Setting the AES**

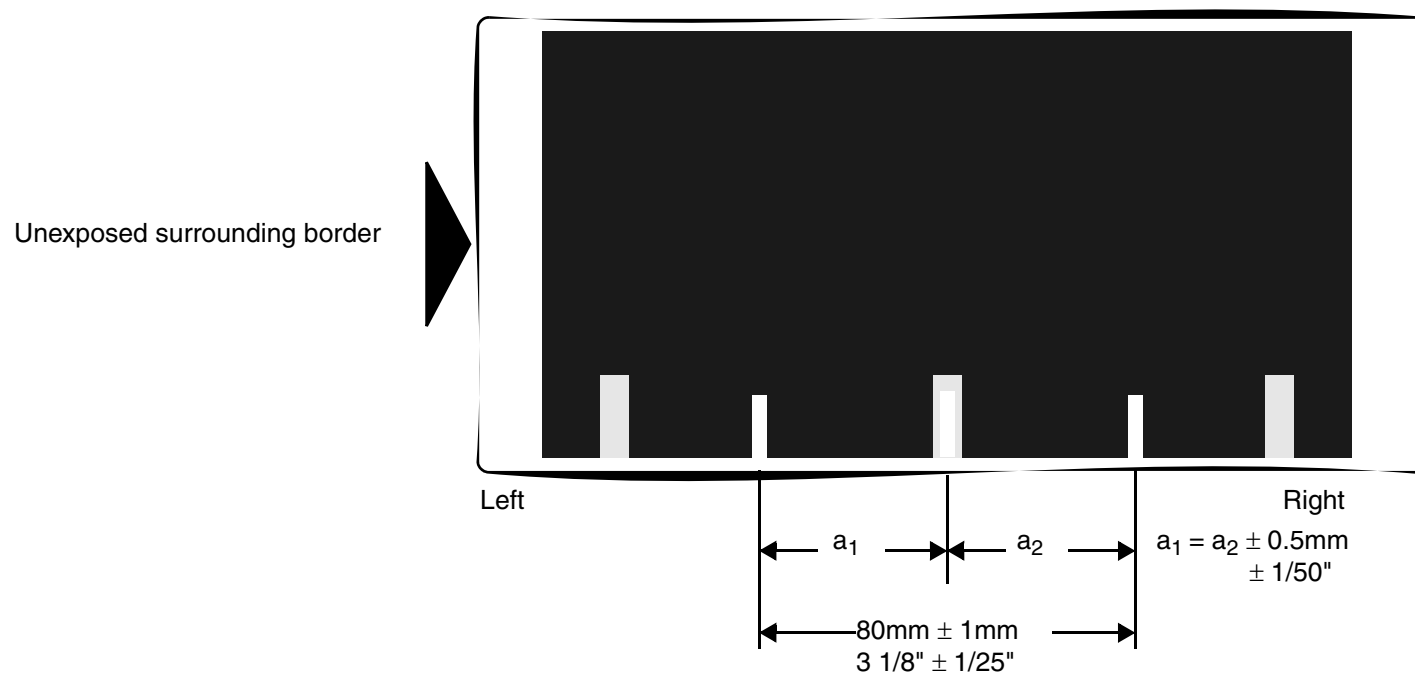


Fig. 25: Needle phantom exposure



*Continued from previous page*

**Check whether the needle phantom exposure is OK:**

**Radiation will be released.**

**Observe the radiation protection guidelines.**

*Use the same type of film as is used by the operator in the practice!*

- Take a needle phantom exposure and compare it with the exposure made during installation.
- Measure needle distances, film length and surrounding border.

If the needle phantom exposure is not correct, adjust actuators M2/M3:

☞ See Chapter 4.1 - Phantom radiograph — Adjusting actuators M2/M3.

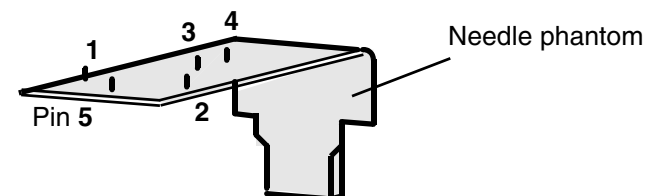


Fig. 26: Needle phantom

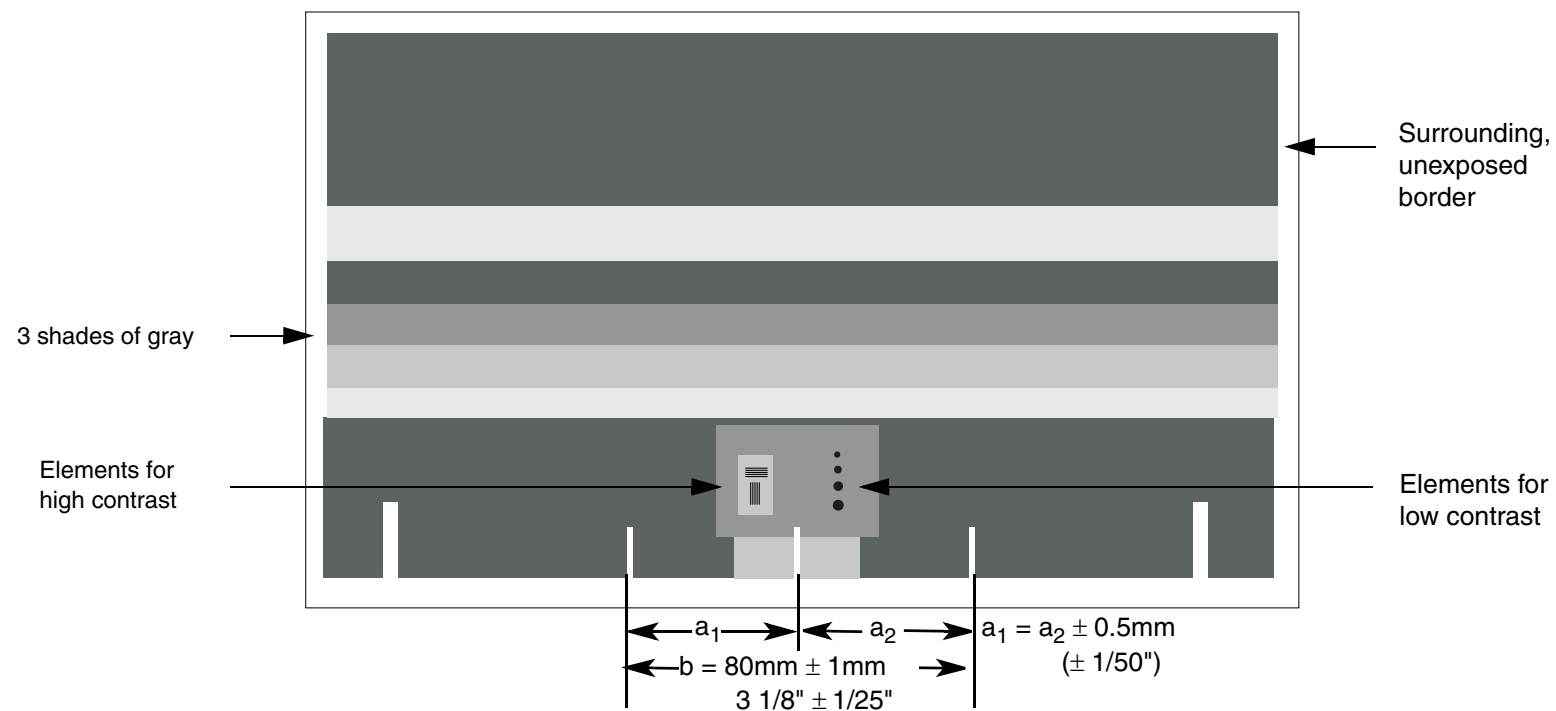


Fig. 27: Needle phantom exposure, phantom exposure

**Check whether the phantom/needle phantom exposure is OK:****Radiation will be released.****Observe the radiation protection guidelines.**

- Make SIDEXIS ready for an exposure and take an exposure:
  1. Select diaphragm position 10.
  2. Remove bite block/contact segment.
  3. Insert exposure phantom into bite block holder.
  4. Insert contrast element **A** with hole into plug-in plate of exposure phantom.
  5. Mount phantom with clamp on sensor.
  6. Move unit into starting position.
  7. Release exposure.

- Compare the exposure just taken with a control exposure.

If the phantom/needle phantom exposure is not correct, adjust the X-ray beam:

- ☞ See Chapter 4.1 - Phantom radiograph — Adjusting actuators M2/M3.
- ☞ See Chapter 4.2 - Checking and adjusting the X-ray beam for panorama radiograph.

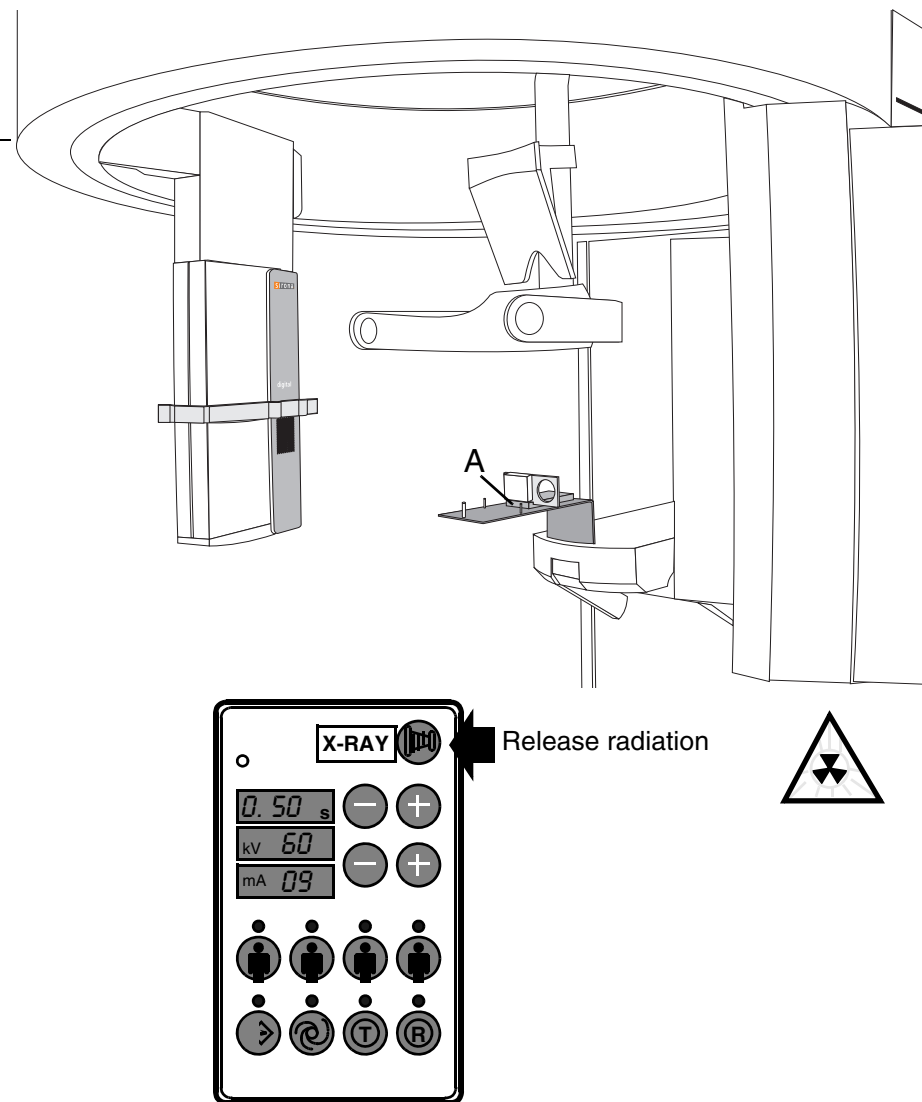


Fig. 28: Phantom / needle phantom exposure

**7.13 Phantom/needle phantom exposure with ORTHOPHOS Plus DS/Plus DS Ceph**

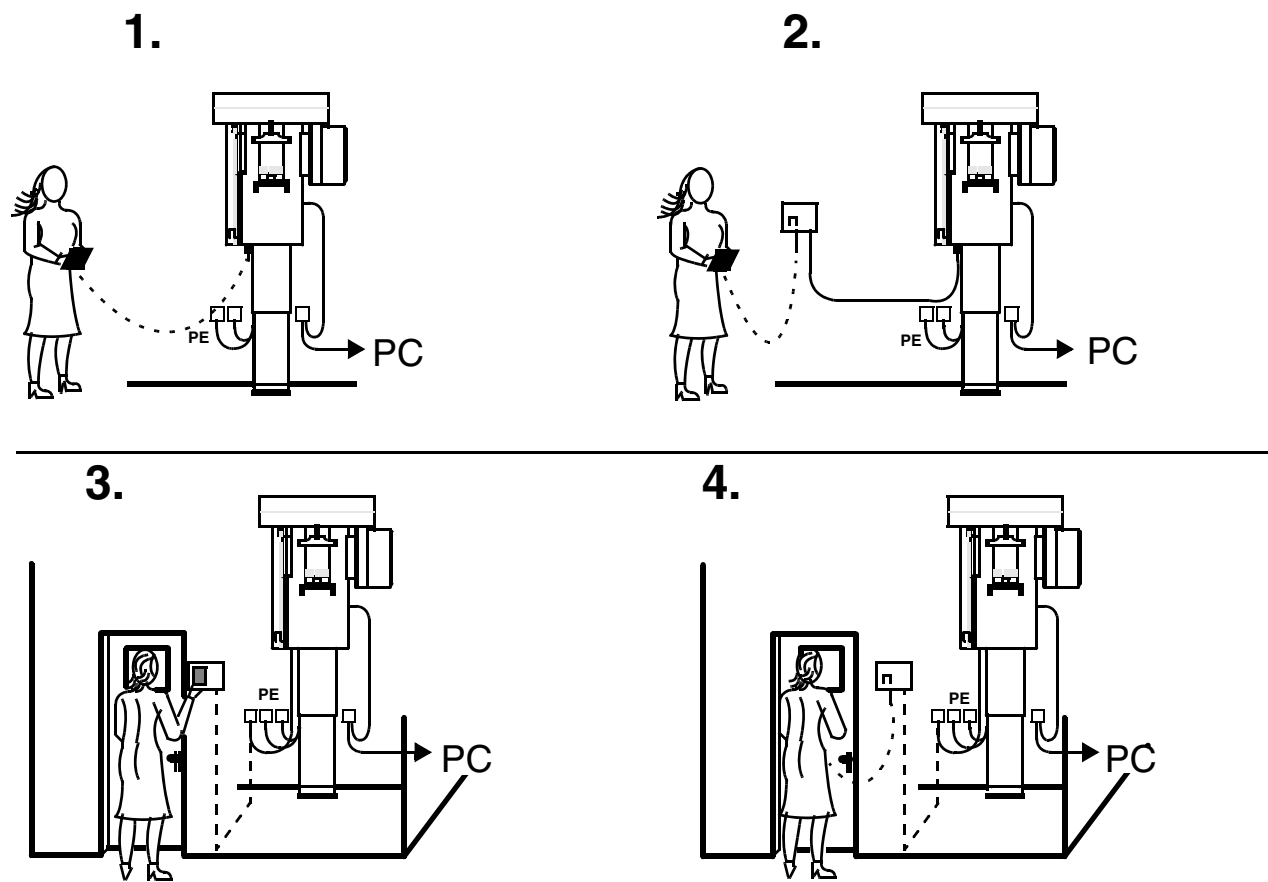
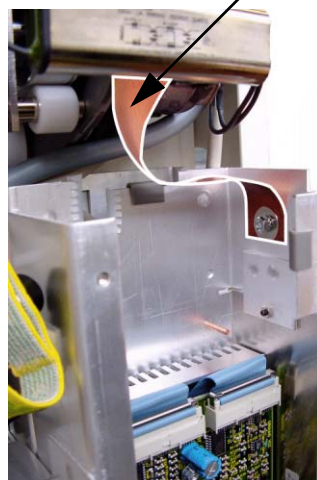


Fig. 29: Possible cable routings

**Check whether the routing of the cables to the unit is OK:**

- Check power cable, protective ground wire, control cables and data transfer cables.
- Perform a visual check to make sure that the cables show no external signs of damage.

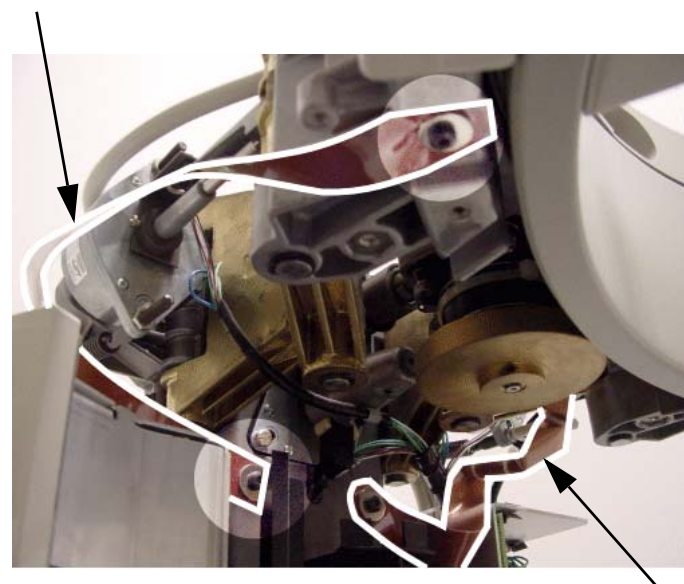
If a cable is externally damaged, replace it.



Motor M5



Door



Rotary ring

**Fig. 30: Position of grounding straps**

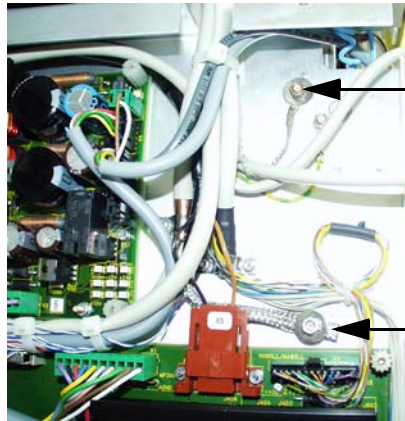
**Check whether the grounding straps have complete and firm contact at the positions marked:**

- Check the grounding straps visually and by touching them with your hands.

☞ See Fig. 30: Position of grounding straps.

If the grounding straps do not have complete and firm contact, fasten them properly.

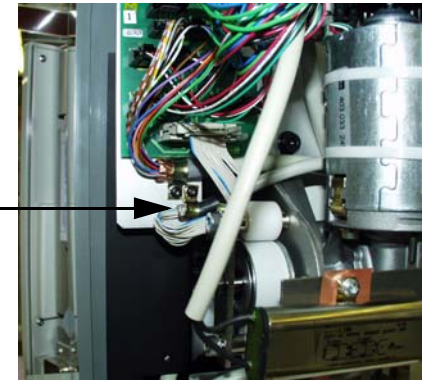
If the grounding straps are damaged, replace them.



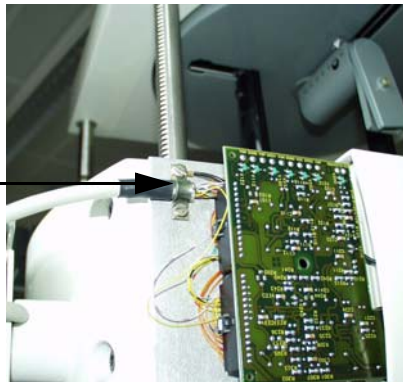
DX1



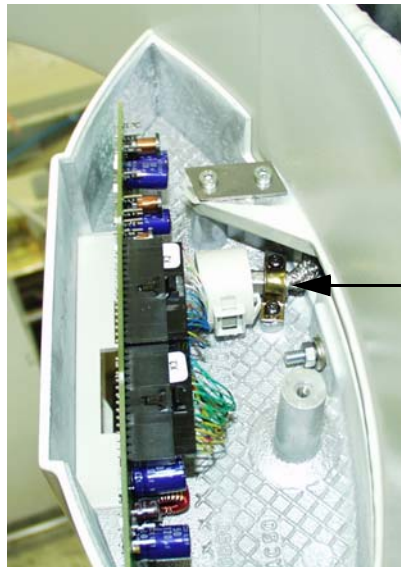
DX31



DX5



Cephalometer



PCB RHB



X-ray tube assembly

**Fig. 31: Position of shielding**



**Check whether the shielding of the cables has firm contact:**

- Check the cable shielding visually and manually at the positions marked above.

☞ See Fig. 31: Position of shielding.

If the shielding does not have firm contact with the cables, fasten the shielding properly.

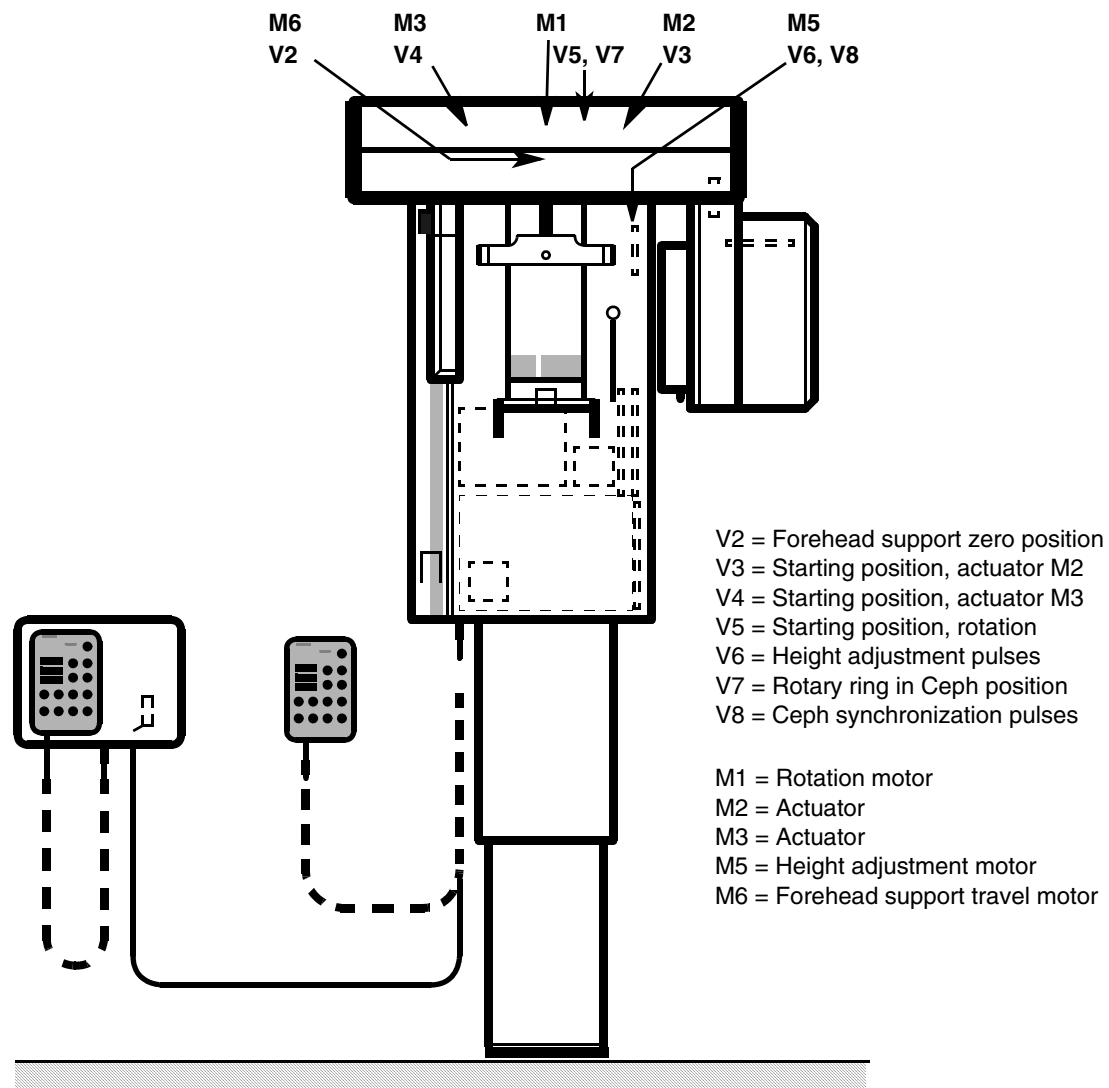


Fig. 32: Position of light barriers V2 – V8

### Check whether light barrier housings V2 to V8 are free of damage and properly secured:

- Remove the ring cover.
- Perform a general check of light barriers for mechanical obstruction by pinched litz wires etc. and eliminate problem if necessary:  
 ☞ See Fig. 32: Position of light barriers V2 – V8.
- Perform a visual check of light barriers for damage or wear and tear, e.g. scuff marks or cracks.
- Check light barriers for firm fastening with your hands.

If individual light barriers are damaged, replace them.

### Check whether the ring cable shows signs of external damage or wear and tear:

- Check visually while turning the rotary ring through its entire adjustment range by hand.

If the ring cable does not properly snuggle into the shaft of the ring as a loop, replace the ring cable:

☞ See Fig. 33: Position of ring cable L10.

☞ See Chapter 6.16 - Replacing ring cable L10.

If the insulation of the ring cable is seriously damaged, replace the ring cable:

☞ See Chapter 6.16 - Replacing ring cable L10.

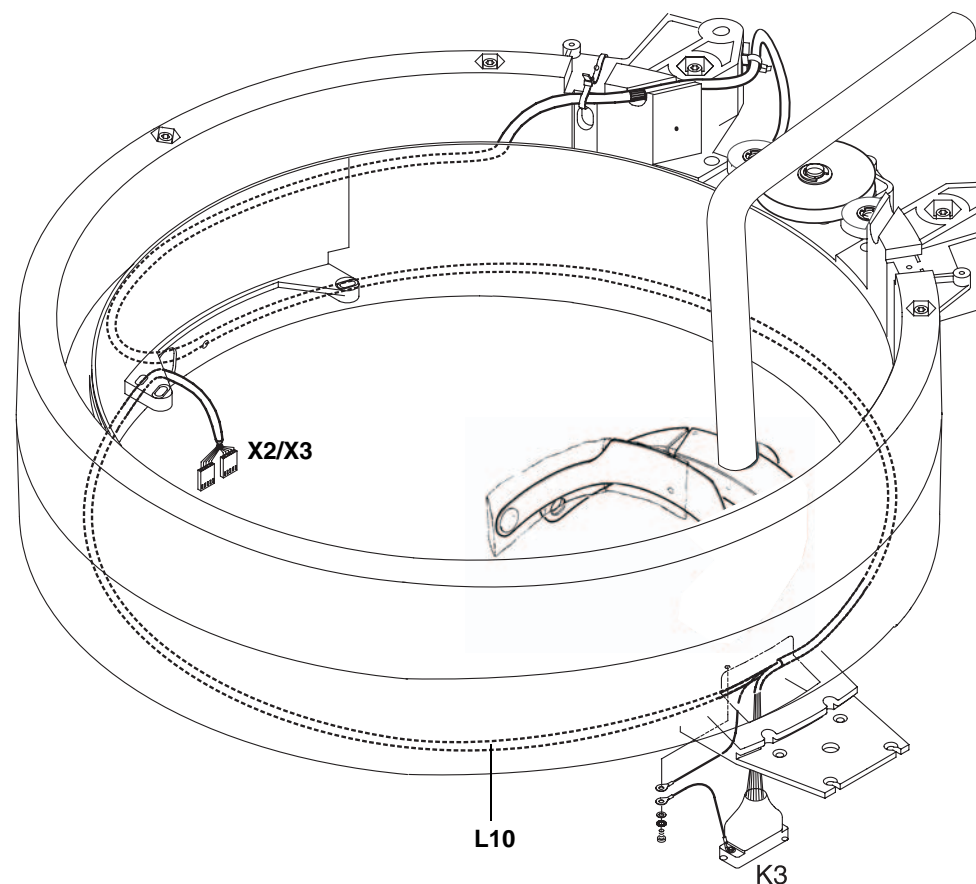


Fig. 33: Position of ring cable L10

## 7.17 Checking light barrier housings V2 to V8/ring cable

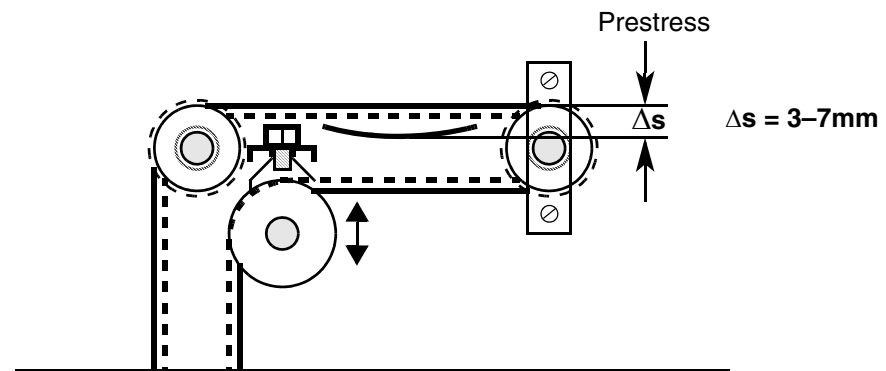


Fig. 34: Prestress of toothed belt

**Check the toothed belt on height adjustment motor M5 for signs of damage:**

- Check visually for cracks and wear and tear.

If the toothed belt is damaged, replace it:

☞ See Chapter 6.4 - Replacing the height adjustment motor M5.

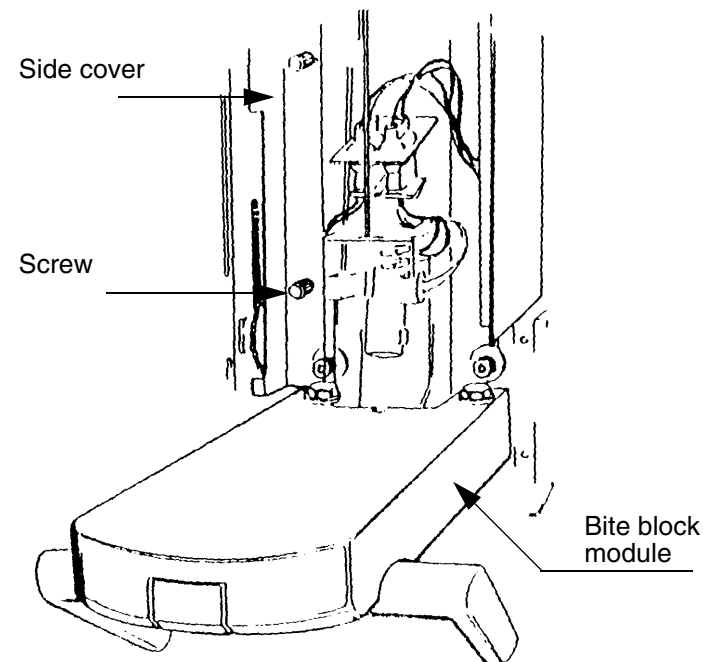
**Check whether the prestress of the toothed belt is sufficient:**

- Check prestress of toothed belt ( $\Delta s$ ) . ☞ See Fig. 34: Prestress of toothed belt.

If the prestress of the toothed belt is not sufficient, tension the toothed belt with the clamping screw:

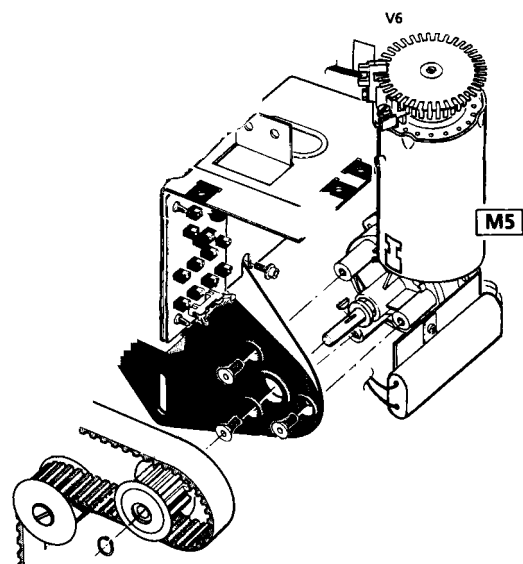
☞ See Chapter 6.4 - Replacing the height adjustment motor M5.

*Continued on next page*

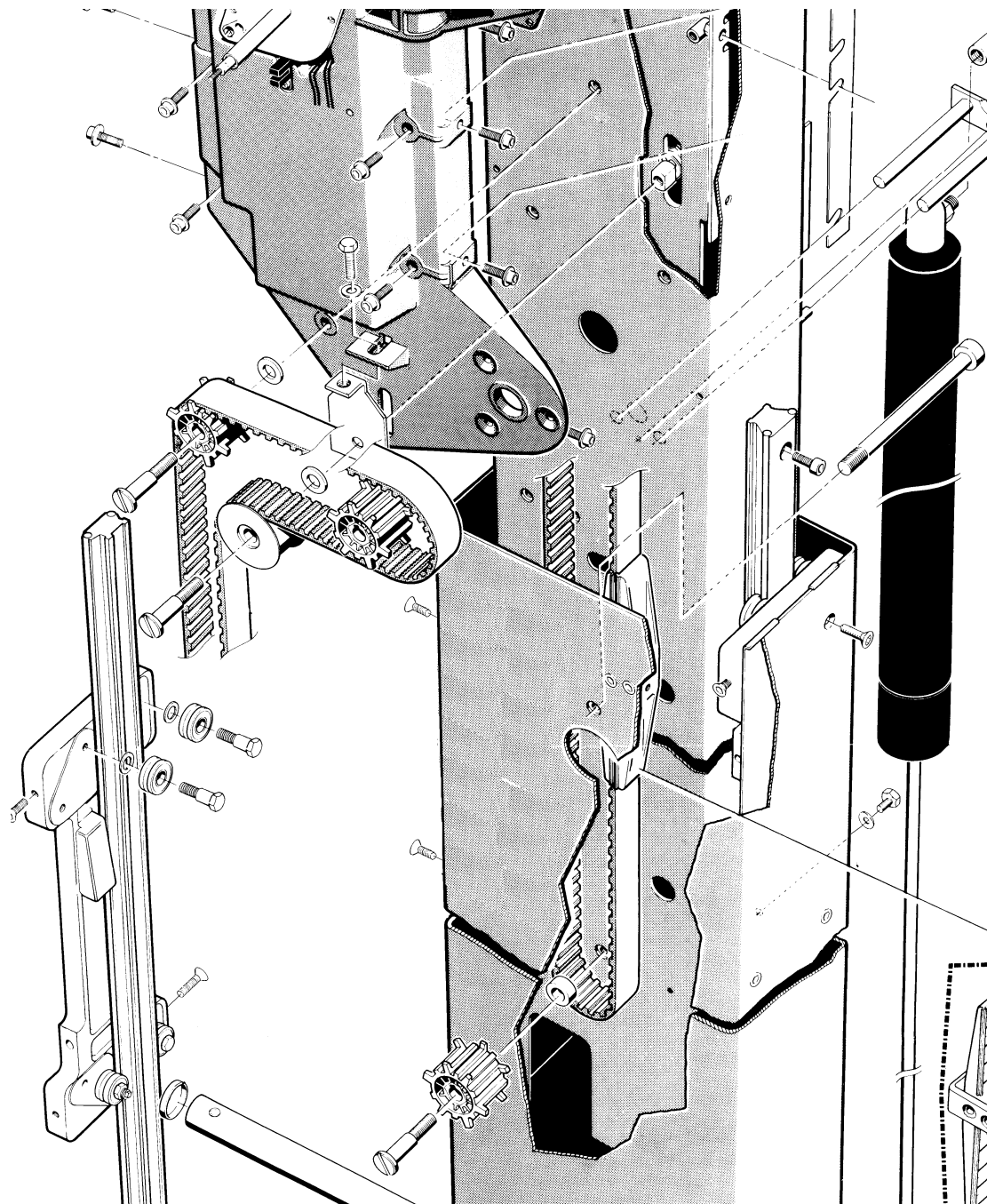


**Fig. 35: Bite block module**

**7.18 Checking the toothed belt, deflection roller and toothed roller on height adjustment motor M5**



**Fig. 36: Position of tensioning roller, deflection roller and toothed roller on height adjustment motor M5**



Continued from previous page

**Check tensioning roller/deflection roller on height adjustment motor M5 for signs of damage:**

- Check visually for cracks, wear and tear and bearing.

If the tensioning roller/deflection roller is damaged, replace it:

👉 See Chapter 6.4 - Replacing the height adjustment motor M5.

**Check toothed rollers on height adjustment motor M5 for signs of damage:**

- Perform acoustic check while moving unit up and down.

If the toothed rollers are damaged, replace them:

👉 See Chapter 6.4 - Replacing the height adjustment motor M5.

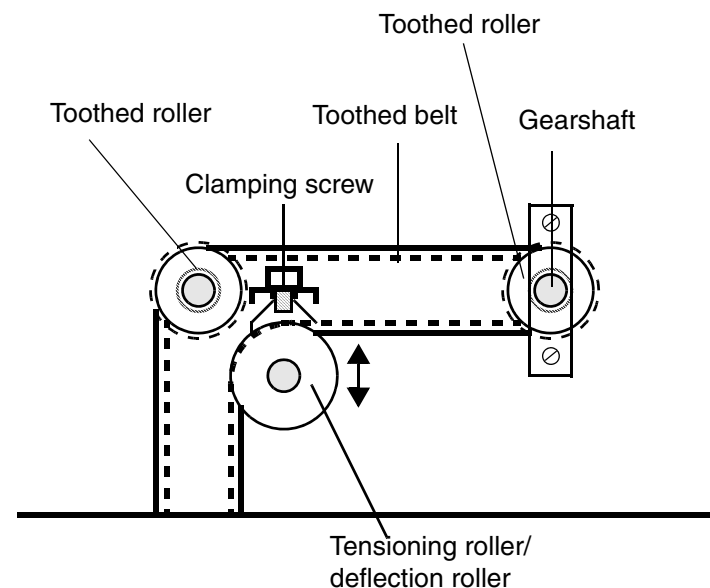
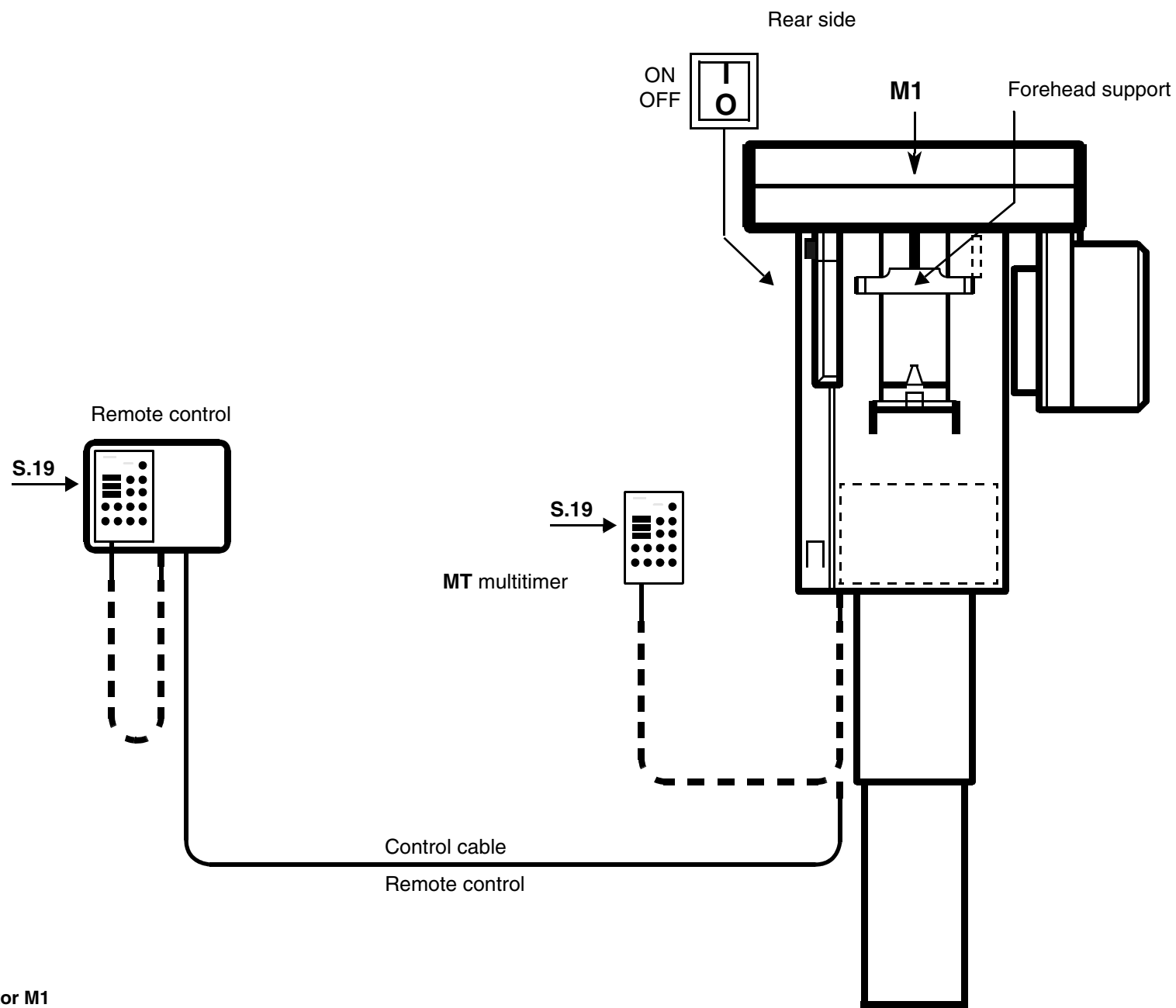


Fig. 37: Tensioning roller/deflection roller and toothed rollers

## 7.18 Checking the toothed belt, deflection roller and toothed roller on height adjustment motor M5

**Fig. 38: Rotation motor M1**



### Check whether the prestress of the flat belt on rotation motor M1 is sufficient:

- Trigger rotation while holding the X-ray tube assembly in place. The motor must jam.

If the motor does not jam and the flat belt slips, adjust the flat belt:

☞ See Chapter 6.2 - Replacing the rotation motor M1.

### Check whether the counterbalancing disk on rotation motor M1 is properly attached:

- Check with your hands.

If the counterbalancing disk is not properly attached, tighten it with the setscrews.

*First screw the counterbalancing disk tight with the first setscrew; then secure it with the second setscrew.*

☞ See Fig. 39: Tension of flat belt.

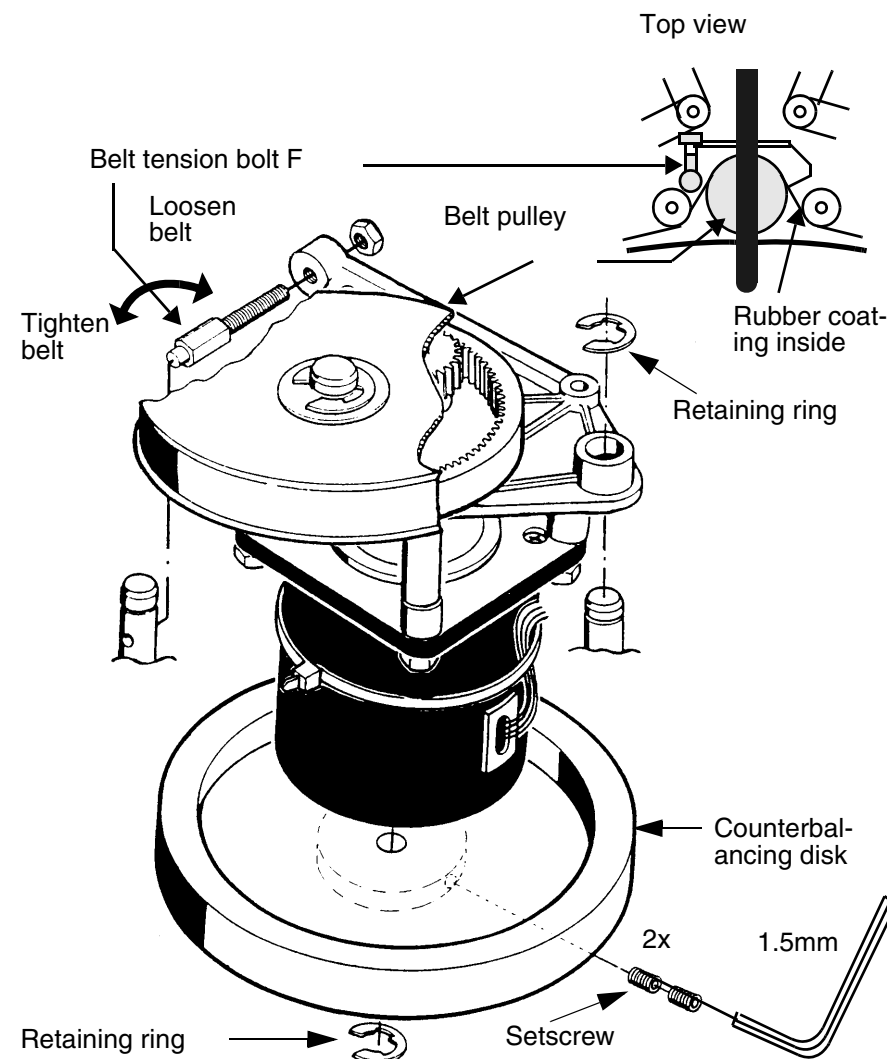


Fig. 39: Tension of flat belt

## 7.19 Checking the flat belt on rotation motor M1

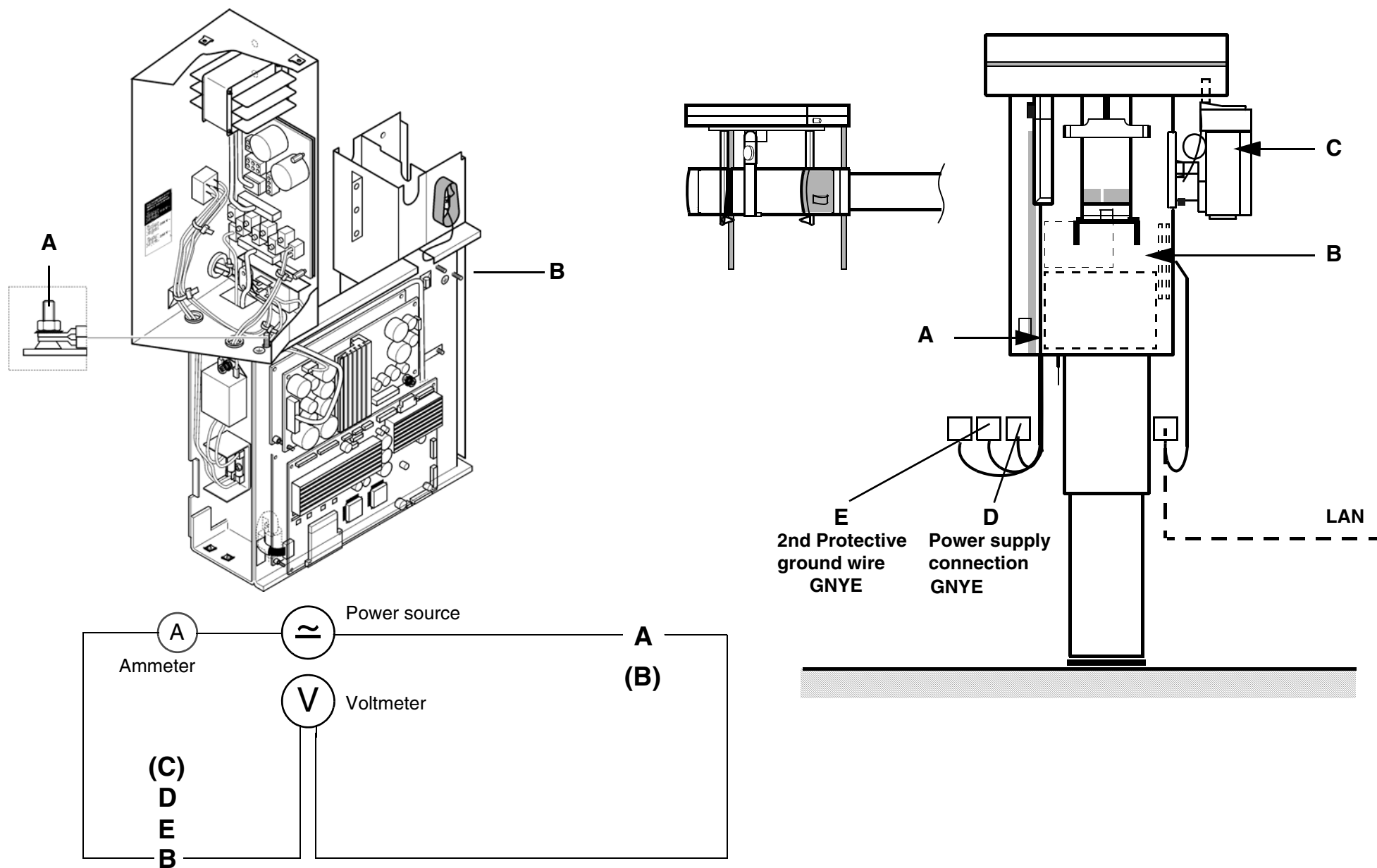


Fig. 40: Measuring setup for protective ground wire test

**DANGER**

**DANGER: Perilous shock hazard.**  
**Switch power off.**

- Switch power OFF at the main switch for the building installation.
- For pluggable units, remove the power plug from the electric outlet.
- Remove the power connection from the line terminal. Unclamp the second protective ground wire.
- Remove the following cover parts.
  - Cover
  - Segment
  - Rear lateral cover plate (cover 1)
  - Front panel (cover 3)
  - X-ray tube assembly cover.

**Check whether the protective ground wire resistance (Table 1) complies with the specifications:**

A power source of at least 0.2A with a no-load voltage of 24V max. and 4V min. is required.

- Apply an electric current between the parts specified in Table 1 for at least 5s.
- Measure the voltage drop with the voltmeter and the current with the ammeter. Then calculate the resistance using the formula  $R = U / I$ .

If the resistance exceeds the value specified in Table 1:

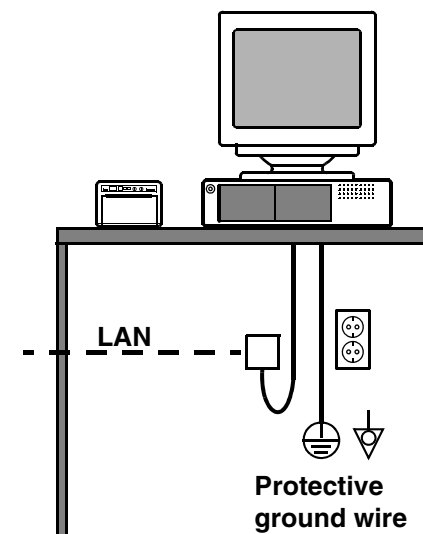
**Check whether the protective ground wire is fastened according to specifications:**

- Check whether the flat washer, toothed lock washer and cable lug are mounted on the protective ground wire in the right order and whether the nuts of the ground wire connections are tightened securely.

If the ground wire is not fastened according to specifications, fasten the ground wire properly.

| Table 1: Protective ground wire test between |          |                                   |                                |
|----------------------------------------------|----------|-----------------------------------|--------------------------------|
| <b>A and</b>                                 | <b>D</b> | <b>GNYE wire</b>                  | <b>0.1 <math>\Omega</math></b> |
| <b>A and</b>                                 | <b>E</b> | <b>2nd Protective ground wire</b> | <b>0.1 <math>\Omega</math></b> |
| <b>A and</b>                                 | <b>B</b> | <b>Stud</b>                       | <b>0.2 <math>\Omega</math></b> |
| <b>B and</b>                                 | <b>C</b> | <b>Tube assembly housing</b>      | <b>0.2 <math>\Omega</math></b> |

**Only ORTHOPHOS Plus DS / PLUS DS Ceph**



**Fig. 41: Protective ground wire test**

*Continued on next page*

## 7.20 Checking the protective ground wire and the unit's leakage current

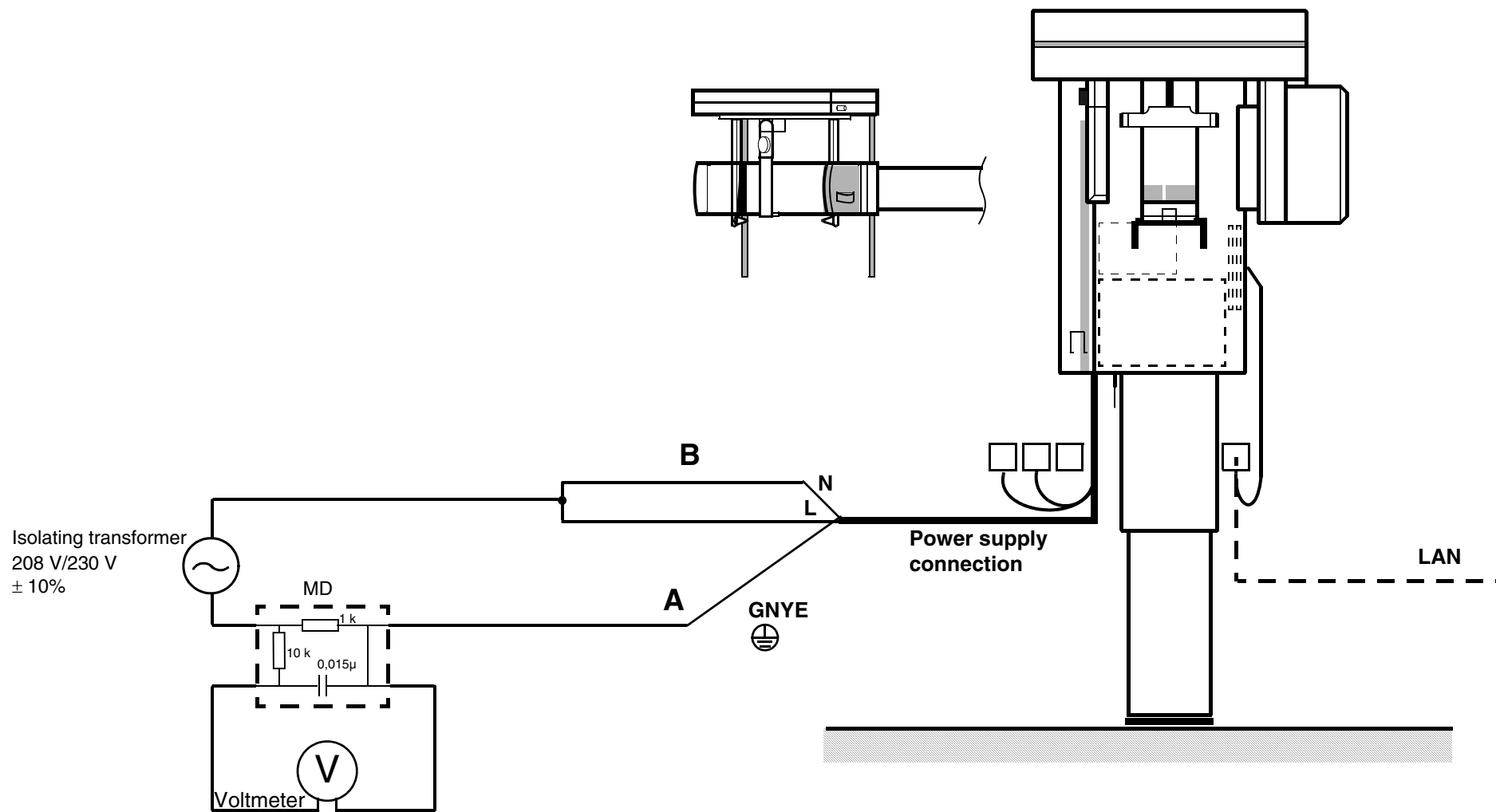


Fig. 42: Measuring setup for testing the unit's leakage current

Continued from previous page

### Check whether the unit's leakage current complies with the specifications:



#### **DANGER**

**DANGER: Perilous shock hazard:**

**Do not touch the unit's housing while measuring the leakage current.**

A high resistance measuring voltage source at line frequency and a measuring circuit compliant with the requirements of IEC 601 are required.

Complete test units, e.g. the "Bender tester", fulfill these requirements.

- Check whether the unit power switch is turned on.
- Connect a high resistance measuring voltage source between the short-circuited power cable or plug B and ground wire A.
- Measure voltage drop across MD.

The numerical value of the measurement corresponds to the leakage current in  $\mu\text{A}$ , see adjacent table.

The measured value must not exceed **5 mA**.

- Enter measurement results in maintenance certificate for subsequent comparison measurements.
- Describe or enter the measuring instrument or measuring setup used in the adjacent field for reasons of reproducibility.

If the leakage current is not OK, measure the input interference suppression filter and check whether the leakage current is still too high.

If the leakage current is still too high, this may be due to one of several different reasons:

- Damaged cables
- Isolation fault in the motor
- Missing isolation plates
- Shields stuck or lying on top
- Plugs improperly fastened etc.

| Measuring range |   | Leakage current |  |
|-----------------|---|-----------------|--|
| mV              | = | $\mu\text{A}$   |  |
| V               | = | mA              |  |

Describe and enter measuring setup/measuring instrument:

Fig. 43: Comparison table: Leakage current and measuring range

## 7.20 Checking the protective ground wire and the unit's leakage current



## 8 **Technical modifications**

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# Technical modifications

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## Contents

- 8.1 History - Service Manual D3297
- 8.2 Additional Documentation:
  - Replacing the Memory Card
  - Replacement of intensifying screens
  - Screws for Sheet-Metal Cover
  - Installing the toothed belt retaining device
  - Replacing DX1
  - Replacing the EEPROM J115 and GAL J1121 on board DX1
  - Replacing the memory card and GAL J1121 on board DX1
  - Replacing the rope
  - Replacing ring cable L4/L10



## 8.1 History - Service Manual D3297

|                     |                                                                                                                                                                        |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Version 1:</b>   | Only ORTHOPHOS Plus DS / Plus DS Ceph and not all errors described yet                                                                                                 |
| <b>Version 2:</b>   | ORTHOPHOS 5/Plus/Plus Ceph with D3297 as well, new DX1                                                                                                                 |
| <b>Version 3:</b>   | Other error messages added                                                                                                                                             |
| <b>Version 3.1:</b> | Additions to pages: 1-5, 1-16, 3-45, 4-5 – 4-13, 4-37, 5-15 – 5-17, 5-23 – 5-27, 5-65, 6-17, 7-1 – 7-3, Replacing the Memory Card, Replacement of intensifying screens |
| <b>Version 4.0:</b> | Supports ORTHOPHOS with Ethernet interface, alternative dose series, programmable anomaly, TSA.                                                                        |
| <b>Version 5.0:</b> | Chapter Maintenance added, service routine S.24, replace rotary knob and sensor ejector, replace ring cable L10                                                        |
| <b>Version 5.1:</b> | Additions to pages: 1-5, 1-8, 3-111, 3-119, 4-45, 5-25, 7-23 – 7-25, 7-52 – 7-53                                                                                       |
| <b>Version 5.2:</b> | Additions to pages: 6-35, 6-37, 6-49                                                                                                                                   |

## 8.2 Additional Documentation:

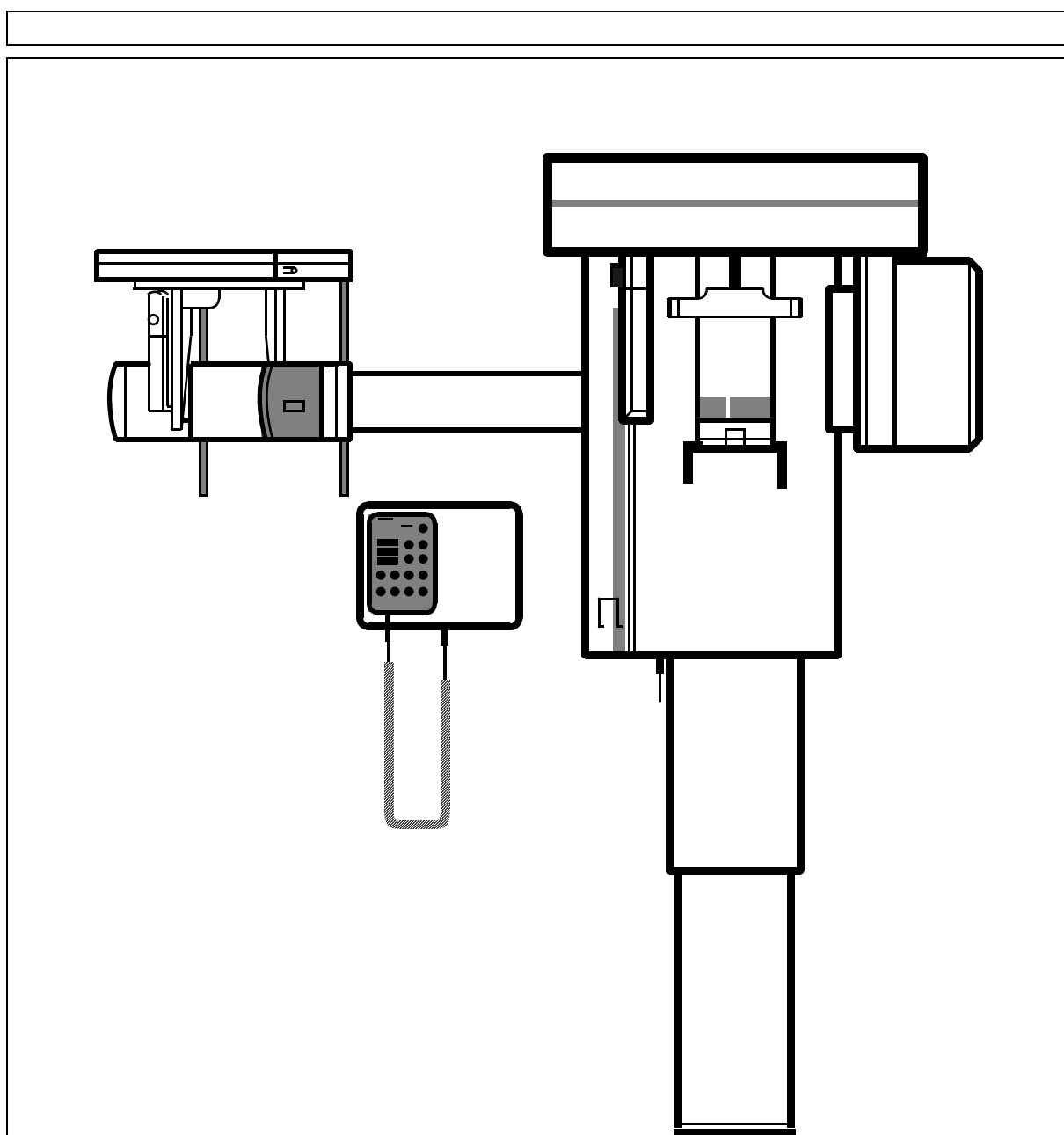
### 8.2 Additional Documentation:

New since:

07.2001

# ORTHOPHOS Plus DS ORTHOPHOS Plus DS Ceph

Replacing the Memory Card



## ATTENTION



***Interference with electromedical devices by radio telephones:***

***To guarantee the operational safety of electromedical devices, the operation of mobile radio telephones in the medical practice or hospital area is prohibited.***

## ATTENTION



***When opening the equipment:***

***Please observe the safety measures for handling PC boards.***

***Touch a ground point to remove any personal electrostatic charge before touching the components.***



New since:

07.2001

**Modification compared with last edition: 12.1999**

### Chapter or paragraph, page

2 Compatibility of Memory Card, 6

3 Replacement Compatibility, 7

4 Version Features, 7

7 Proof of Memory Card Upgrade, 11

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2    Compatibility of Memory Card ..... 6

3    Replacement Compatibility ..... 7

4    Version Features ..... 7

5    Upgrade with Memory Card ≥ V031 ..... 8

6    Replacing the Memory Card (Version ≥ V025) ..... 9

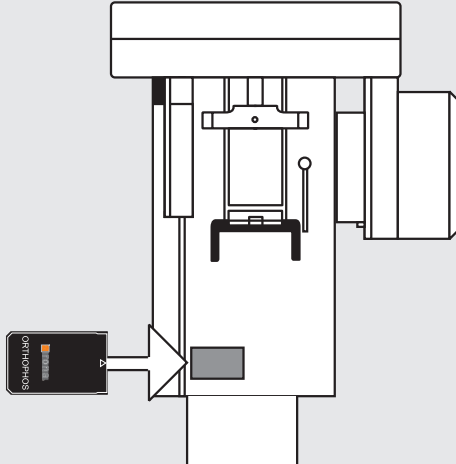
7    Proof of Memory Card Upgrade ..... 11



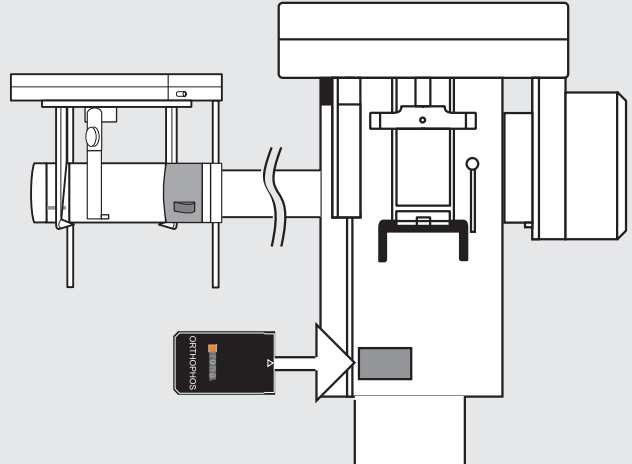
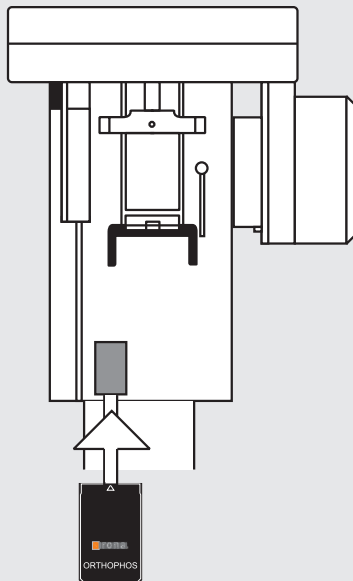
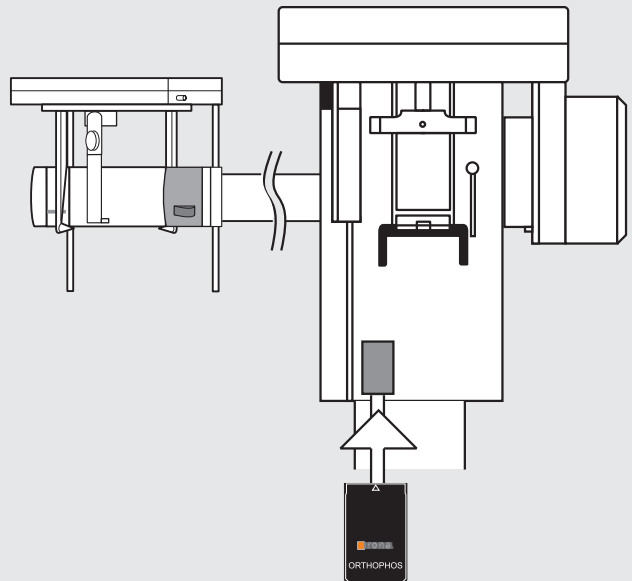
## 1

# Location for Installing Memory Card

Serial-No.: 1001 - 1399



Serial-No.: 50001 - 50399

Serial-No.:  $\geq 1400$ Serial-No.:  $\geq 50400$ 

# 2 Compatibility of Memory Card

| ORTHOPHOS Plus DS      |                  |                          |
|------------------------|------------------|--------------------------|
| Memory Card            | REF number       | in use since serial no.: |
| 256KB                  | 58 42 005 D 3297 | 01000                    |
| 2MB                    | 58 42 021 D 3297 | 01446                    |
| 2MB                    | 58 59 876 D 3297 | 02000 TSA                |
| ORTHOPHOS Plus DS Ceph |                  |                          |
| 256KB                  | 58 42 005 D 3297 | 50000                    |
| 2MB                    | 58 42 021 D 3297 | 50459                    |
| 2MB                    | 58 59 876 D 3297 | 52000 TSA                |

## NOTE



*The change from 256kB to 2MB memory cards was made in order to provide for future expansions (with regard to program extensions/changes).*

## NOTE



*In all units in which 2MB memory cards can be installed, 256kB memory cards will also function.*

| ORTHOPHOS Plus DS / Plus DS Ceph     |                                    |      |     |      |     |                                           |      |      |                                       |  |
|--------------------------------------|------------------------------------|------|-----|------|-----|-------------------------------------------|------|------|---------------------------------------|--|
| Memory Card                          | SIDEXIS<br>runs under WfW 3.x/ W95 |      |     |      |     | SIDEXIS<br>runs under<br>W95/W98/NT/W2000 |      |      | SIDEXIS<br>runs under<br>W98/NT/W2000 |  |
|                                      | 2.1                                | 2.11 | 2.2 | 2.21 | 3.2 | 4.2                                       | 5.2x | 5.3x | 5.5                                   |  |
| V016                                 | X                                  | X    |     |      |     |                                           |      |      |                                       |  |
| V018                                 |                                    |      | X   | X    |     |                                           |      |      |                                       |  |
| V020                                 |                                    |      | X   | X    |     |                                           |      |      |                                       |  |
| V021                                 |                                    |      | X   | X    |     |                                           |      |      |                                       |  |
| V022                                 |                                    |      | X   | X    |     |                                           |      |      |                                       |  |
| V023                                 |                                    |      | X   | X    |     |                                           |      |      |                                       |  |
| V025                                 |                                    |      |     |      | X   | X                                         | X    | X    | X                                     |  |
| V026                                 |                                    |      |     |      | X   | X                                         | X    | X    | X                                     |  |
| V027                                 |                                    |      |     |      | X   | X                                         | X    | X    | X                                     |  |
| V031                                 |                                    |      |     |      | X   | X                                         | X    | X    | X                                     |  |
| V035                                 |                                    |      |     |      |     |                                           | X    | X    | X                                     |  |
| ORTHOPHOS Plus DS / Plus DS Ceph TSA |                                    |      |     |      |     |                                           |      |      |                                       |  |
| V10.12                               |                                    |      |     |      |     |                                           |      |      | X                                     |  |



# 3 Replacement Compatibility

|                  | Currently installed Memory Card |                |                |  |
|------------------|---------------------------------|----------------|----------------|--|
| Replacement with | V027                            | V031           | V035           |  |
| V025             | Not permitted!                  | Not permitted! | Not permitted! |  |
| V026             | X                               | X              | X              |  |
| V027             | —                               | X              | X              |  |
| V031             | —                               | —              | X              |  |

## NOTE



*With the Digital Upgrade Kit the Memory Card replacement corresponds to the installation documentation supplied.*

## NOTE



*In order to prevent misunderstandings in regard to the kV/mA step series set, first set the density switch on the Multitimer to position 3 before replacing the Memory Card (factory setting) and only after successful replacement adapt to the requirements of the user.*

# 4 Version Features

|              |                                                                                                                                                                                                                           |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>V025:</b> | Change of pulse-to-pause ratio from 1:20 to 1:10                                                                                                                                                                          |
| <b>V026:</b> | Update to new DX1                                                                                                                                                                                                         |
| <b>V027:</b> | Reduced kV/mA step series introduced                                                                                                                                                                                      |
| <b>V031:</b> | Includes normal and reduced kV/mA step series. Change is possible under consideration of country-specific regulations with Service Routine S.25.<br>Elimination of error E4 01, which occurred occasionally in Ceph mode. |
| <b>V035:</b> | Supports ORTHOPHOS with Ethernet interface, alternative dose series, programmable anomaly                                                                                                                                 |

# 5 Upgrade with Memory Card $\geq$ V031

Before replacing the Memory Card, it is necessary to determine whether a 256kB or a 2MB version is installed. This determines the order number for the SW upgrade.

Based on the serial number of the unit and Chapter 2 "Compatibility of the Memory Card", determine which version can be used.

SW-Upgrade with Memory Card 256kB:

Order no. **51 68 864**

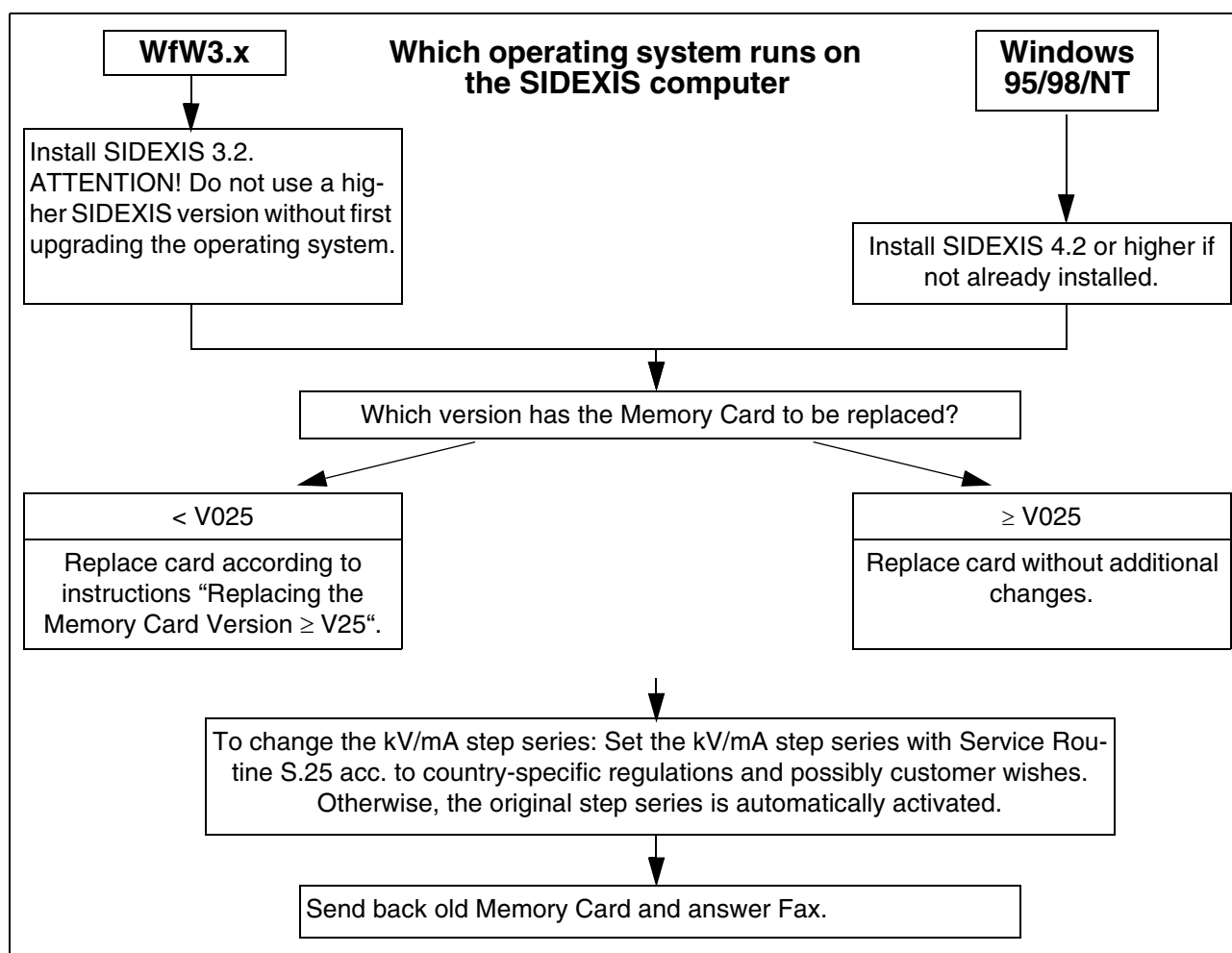
SW upgrade with Memory Card 2MB:

Order no. **58 07 495**

## NOTE

*i*

**Chapter 7 is arranged so that you can remove this page from the instructions and use to send in your answer by Fax.**



- General notes for changing to Windows 95:  
Before changing to Windows 95 it is essential to:  
remove the SIDEXIS entry from Autoexec.bat.  
switch off the SIDEXIS shell (enter command "Sishells 0" in DOS level!)

Do not activate the SIDEXIS shell again after the update!  
In addition, install a possibly already existing SIDEXIS version after successfully installing the Windows 95 update again as an update.

## 6

# Replacing the Memory Card (Version $\geq$ V025)



## Note

***This adjustment procedure is not necessary if the Memory Card to be replaced is already  $\geq$  V025!***

The preheating must be set with the tube assembly already preheated. Perform the following steps:

1. Switch unit on.
2. Establish readiness for exposure via SIDEXIS:
  - Activate the **Constancy check** menu item in the **Utilities** menu.
  - Activate the **Select** menu window in the **X-ray unit** menu.
  - Activate exposure performance key **XC XP**.
  - Activate **Service exposure** in the **Select type of test** selection dialog.
  - Activate **Factory service** (2) in the **Select service exposure** selection dialog.
3. Selecting service routine S.01, releasing exposure
  - Press the Memory key .
  - Then press the Service key (approx. 4s), until the digital displays disappear.
  - Press the Patient icon keys in the order A – B – C within 3s. 

The Service mode is now selected.
  - Press the Service key , this acknowledges the error messages displayed. The Service routine **S.01** appears on the digital display.
  - Press the Service key briefly. 00 lights up on the kV display.
  - Enter Service code 01. 01 lights up on the kV display.
  - Press the Service key briefly. The values on the kV / mA display begin flashing.
  - Set the kV values to 60 kV / 09 mA. The LED's above the patient icon keys light up.
  - Release radiation for 14 seconds.
  - Switch unit off.
  - Close the Service mode in SIDEXIS.
4. Remove cover, withdraw Memory Board **M** and insert new Memory Board **M**. Attach cover. Switch unit on.
5. Establish readiness for exposure via SIDEXIS (see item 2.).
6. Select Service routine S.05 Test step 02.
  - Press the Memory key .
  - Then press the Service key (approx. 4s), until the digital displays disappear.
  - Press the Patient icon keys in the order A – B – C within 3s. 

The Service mode is now selected.
  - Press the Service key , this acknowledges the error messages displayed. The Service routine **S.01** appears on the digital display.
  - Select the Service routine **S.05** with the + or – keys.
  - Press the Service key briefly. 00 lights up on the kV/mA display.
  - Enter Service-Code 05. 05 lights up on the kV display.
  - Press the Service key briefly. The Test step 01 is displayed on the mA display.
  - Select **Test step 02** with the kV+ key. FF FF lights up on the kV/mA display. The LED above the Memory Board flashes.
  - Press the Memory key . The LED above the R key flashes.
  - Press the Return key . 00 00 lights up on the kV/mA display. The LED above the Service key lights up.
  - Press the Service key briefly. 60/09 flashes on the kV/mA display.
  - Press the X-RAY key and **hold down until 05 20 - 05 80 lights up on the kV/mA display. For Memory Card < V027 11 11 is displayed** and the LED above the Memory key flashes. The adjustment procedure executes automatically.
7. Storing the adjustment value:
  - Press the Memory key (LED no longer flashes). The LED above the R key flashes.
  - Press the Return key (LED no longer flashes). The LED above the Service key S23 lights up.
  - Press the Service key . The preheating value is stored.
8. Switch the unit off and back on. Close the Service mode in SIDEXIS.



# 7 Proof of Memory Card Upgrade

|                                                                                   |                                        |                                                                            |                               |                               |
|-----------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------|-------------------------------|-------------------------------|
| TO:<br><b>FAX: 06251-163167</b>                                                   |                                        | Sirona Dental Systems<br>Dpt. X-Ray Marketing<br>64625 Bensheim<br>Germany |                               |                               |
| Upgrade performed by:                                                             |                                        |                                                                            |                               |                               |
| Upgrade performed at:<br>Please use practice stamp<br>or fill in customer address |                                        |                                                                            |                               |                               |
| Serial no. of unit:                                                               |                                        |                                                                            |                               |                               |
| <input type="checkbox"/> ORTHOPHOS Plus DS                                        |                                        | <input type="checkbox"/> ORTHOPHOS Plus DS Ceph                            |                               |                               |
| Version of Memory Card before replacing:                                          |                                        |                                                                            |                               |                               |
| Version of newly installed Memory Card:                                           |                                        |                                                                            |                               |                               |
| <input type="checkbox"/> V025                                                     | <input type="checkbox"/> V026          | <input type="checkbox"/> V027                                              | <input type="checkbox"/> V031 | <input type="checkbox"/> V035 |
| Capacity of newly installed Memory Card:                                          |                                        |                                                                            |                               |                               |
| <input type="checkbox"/> 256KB (REF. 58 42 005) or REF no. of SW upgrade:         |                                        |                                                                            |                               |                               |
| <input type="checkbox"/> 2MB (REF. 58 42 021) or REF no. of SW upgrade:           |                                        |                                                                            |                               |                               |
| Additional information:                                                           |                                        |                                                                            |                               |                               |
| Which operating system is used?                                                   |                                        |                                                                            |                               |                               |
| <input type="checkbox"/> WINDOWS<br>98                                            | <input type="checkbox"/> WINDOWS<br>NT | <input type="checkbox"/> WINDOWS<br>2000                                   |                               |                               |
| Does SIDEXIS run as a single-workstation or multi-workstation system?             |                                        |                                                                            |                               |                               |
| <input type="checkbox"/> Single-WS                                                |                                        | <input type="checkbox"/> Multi-WS                                          |                               |                               |

Thank you for your trouble  
Your SIDEXIS team

---

We reserve the right to make any alterations which may be due to technical improvements.

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Ä-Nr.: 100 628

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**Sirona Dental Systems GmbH**

Fabrikstraße 31  
  
D-64625 Bensheim

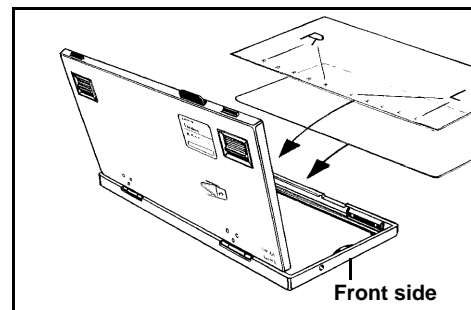
Order No **54 52 854 D 3297**

# ORTHOPHOS

## Series D 3297 / D 3200

### Replacement of intensifying screens

File the enclosed pages in the operating instructions.



#### Series D 3297:

Software prerequisites:

ORTHOPHOS 5 Memory card  $\geq$  V011.51  
ORTHOPHOS Plus/Plus Ceph Memory card  $\geq$  V012.50  
ORTHOPHOS TSA Memory card  $\geq$  V013.52

1. Check the existing system using service routine S.26, test step 01. See service manual, order no. 54 53 571.  
Insert the cassette with the Lanex Medium/TMATG film-screen system (S=250) in the cassette holder.  
The measured value for the system (S=250) indicated on the test phantom must be attained.  
In case of deviations proceed in accordance with the "Check and adjust X ray" chapter in the service manual.

#### Changing the system setting:

2. Set code "33" for the Lanex Regular + TMAT G (S=400) film-screen system, using **service routine S.25**.
3. Open the panorama cassette. Carefully pull out both intensifying screens, which are attached with adhesive.  
**CAUTION:** Stick on the new screen, marked with L/R on the front side. Cover the outside label with Lanex Regular. This must not be done during complete cassette replacement.  
With Orthophos Plus Ceph: Cephalographic X-ray cassette screens must also be replaced, since the same X-ray intensifying screen type must be used for panorama and cephalography.

#### Readjust AES:

4. Insert the panorama cassette with Lanex Regular film-screen in the cassette holder.  
**Note:** use only TMAT/G film for adjustments.
5. **Select service routine S.26 test step 01.**  
Readjust potentiometer R27 on DX8 as described in the service manual.

Turn to the right for a larger measured value,  
turn to the left for a smaller measured value.

**Case 1:** On the test phantom, an AES voltage is already indicated for the system S=400. Adjust the measured value for System 400 using R27. Tolerance:  $\pm 0.05$  V.

**Case 2:** On the test phantom, only the AES voltage is indicated for the Lanex Medium/TMATG (GN) system.  
In this case use the following correction procedure:

Read off the measured value on the test phantom. Subtract 0.15 V from this value and adjust using R27 on the unit.  
Tolerance:  $\pm 0.05$  V.

On the unwritten adhesive label supplied, mark the new measured AES value (10th measured value) and the resulting kV/mA stage and stick onto the test phantom.

Example (typical):

|                              |                   |
|------------------------------|-------------------|
| printed                      | = to be adjusted  |
| value for s=250 (GN)- 0.15 V | = value for S=400 |
| 2.10 V - 0.15 V              | = 1.95 V          |

#### Attention:

If the DX8, version is older than version E3, it can happen that the measured AES value cannot be adjusted for System 400 (potentiometer fully to the right). Replace DX8 in this case (version E3 or newer) and readjust the AES with the activated film-screen system (400).

#### Note:

**No longer** use cassettes with old screens after readjustment.

#### Series D 3200:

Software prerequisite:

at least general software version 06

1. Check the existing system:  
Insert the cassette with the Siemens Special (BL) and/or Lanex medium (GN) film-screen combination and a film suitable for this screen in the cassette holder. The measured value indicated on the test phantom must be achieved. See service manual, order no. 27 97 553, "Check AES" chapter.  
Carry out the described measures in the case of deviations. The conditions specified under "Check AES/Requirements" must be fulfilled.

#### Changing the system setting:

2. Enter code "30" for the Lanex Regular/ TMAT G film-screen combination on the unit. See the "Film/intensifying screen combinations" chapter in the service manual.
3. Open the panorama cassette. Carefully pull out both intensifying screens, which are attached with adhesive.  
**ATTENTION:** Stick on the new screen, marked with L/R on the front side. Cover the outside label with Lanex Regular. This must not be done during complete cassette replacement.  
With Orthophos C: Cephalographic X-ray cassette screens must also be replaced, since the same X-ray intensifying screen type must be used for panorama and cephalography.

#### Readjust AES:

4. Insert the panorama cassette with Lanex Regular film-screen in the cassette holder.  
**Note:** use only TMAT/G film for adjustments.
5. Readjust potentiometer R27 on D8 as described in the service manual chapter under "AES correction".  
Turn to the right for a larger measured value,  
turn to the left for a smaller measured value.

**Case 1:** With the previous Siemens Special (BL) film-screen system, work with the following correction procedure:  
Read off the measured value indicated on the test phantom for Siemens Special (BL). Subtract 0.20 V from this value and set the resulting value ( $\pm 0.05$ ), using R27 on the unit.  
(Note: with substitute test phantoms for both unit variants D3200 and D3297 read the value at D3200 / 200 (Siemens Special).  
On the unwritten adhesive label supplied, mark the new measured AES value (10th measured value) and the resulting kV/mA stage and stick onto the test phantom.

**Case 2:** With the previous Lanex Medium (GN) film-screen system, work with the following correction procedure:  
Read off the measured value indicated on the test phantom for Lanex Medium (GN).  
The measured AES value must be corrected again, exactly in accordance with the measured value indicated on the test phantom for "Lanex Medium (GN)" ( $\pm 0.05$  V).  
(Note: with substitute test phantoms for both unit variants D3200 and D3297 read the value at D3200 / 250 (Lanex Medium)).  
On the unwritten adhesive label supplied, mark the new measured AES value (10th measured value) and the resulting kV/mA stage and stick onto the test phantom.

#### Note:

**No longer** use cassettes with old screens after readjustment.





# ORTHOPHOS Plus / Plus Ceph D3297

## Programmwerte Program Values

## Valeurs de programme Valores de programa

**Verstärkungsfolien Kodak Lanex Regular (grün emittierend) mit Film Kodak T-Mat G / RA oder Agfa Dentus Ortholux.**  
**Intensifying Screen Kodak Lanex Regular (sensitive to green) with film Kodak T-Mat G / RA or Agfa Dentus Ortholux**  
**Écrans renforçateurs Kodak Lanex Regular (sensible au vert) avec film Kodak T-Mat G / RA ou Agfa Dentus Ortholux**  
**Hojas reforzadoras Kodak Lanex Regular (sensibles al verde) con película Kodak T-Mat G / RA o Agfa Dentus Ortholux**

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| ABV/P1                                       |                                                                                                                                                      |                                                                                       | 68/9                                                                                                                                                                                                                                                                                                      | 71/9   | 77/8   | 83/8   | 68/9                                                                                                                                                                                                                                                                                                                                                                                                                                   | 71/9 | 77/8 | 83/8 |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|
| Programm<br>Program<br>Programme<br>Programa | Programm-<br>ablaufzeit ca.<br>Program<br>duration approx<br>Temps d'<br>exécution de<br>progr. env.<br>Tiempos de<br>ciclos de pro-<br>grama aprox. | Aufnahmezeit<br>max.<br>Exposure time<br>Temps<br>de pose<br>Tiempos de<br>exposición | Vom Werk programmierte Werte bei<br>Schwärmungsschalterstellung 03<br>Factory-programmed values with a film<br>density of 03<br>Valeurs programmées à l'usine avec<br>position du commutateur de<br>noircissement 03<br>Valores programados desde fábrica en la<br>posición 03 del conmutador de densidad |        |        |        | Frei programmierte Werte oder Werte bei<br>verändertem Schwärmungsangleich:....<br>– hier eintragen –<br>Freely programmed values or values with other film<br>density:.... – please enter here –<br>Valeurs librement programmées ou valeurs<br>avec correction du noircissement modifiée: ....<br>– inscrire ici –<br>Valores libremente programados o valores en caso de<br>adaptación de densidad modificada: .... – anotar aquí – |      |      |      |
|                                              |                                                                                                                                                      |                                                                                       |                                                                                                                                                                                                                                                                                                           |        |        |        |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P1                                           | 24s                                                                                                                                                  | 14.1s                                                                                 | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P2                                           | 24s                                                                                                                                                  | 11.8s                                                                                 | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P3                                           | 54s                                                                                                                                                  | 16.2s                                                                                 | 64/10                                                                                                                                                                                                                                                                                                     | 68/10  | 70/10  | 73/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P4                                           | 26s                                                                                                                                                  | 8.1s                                                                                  | 66/10                                                                                                                                                                                                                                                                                                     | 68/10  | 70/10  | 73/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P5                                           | 28s                                                                                                                                                  | 10.1s                                                                                 | 68/10                                                                                                                                                                                                                                                                                                     | 70/10  | 73/9   | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P6.1+P6.2                                    | 27+27s                                                                                                                                               | 12.8s                                                                                 | 68/10                                                                                                                                                                                                                                                                                                     | 70/10  | 73/9   | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P7.1+P7.2                                    | 27+27s                                                                                                                                               | 18.7s                                                                                 | 68/10                                                                                                                                                                                                                                                                                                     | 70/10  | 73/9   | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P8                                           | 108s                                                                                                                                                 | 25.3s                                                                                 | 68/10                                                                                                                                                                                                                                                                                                     | 70/10  | 73/9   | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P9                                           | 94s                                                                                                                                                  | 22.9s                                                                                 | 68/10                                                                                                                                                                                                                                                                                                     | 70/10  | 73/9   | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P10                                          | 24s                                                                                                                                                  | 11.8s                                                                                 | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P11                                          | 19s                                                                                                                                                  | 14.4s                                                                                 | 66/10                                                                                                                                                                                                                                                                                                     | 68/10  | 73/9   | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P12                                          | 20s                                                                                                                                                  | 4.9s                                                                                  | 70/10                                                                                                                                                                                                                                                                                                     | 76/9   | 80/9   | 83/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P13                                          | 23s                                                                                                                                                  | 14.4s                                                                                 | 70/10                                                                                                                                                                                                                                                                                                     | 76/9   | 80/9   | 90/8   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P14                                          | 24s                                                                                                                                                  | 8.1s                                                                                  | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P15                                          | 24s                                                                                                                                                  | 8.1s                                                                                  | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P16                                          | 95s                                                                                                                                                  | 21.4s                                                                                 | 73/9                                                                                                                                                                                                                                                                                                      | 76/9   | 80/9   | 83/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P17                                          | 41s                                                                                                                                                  | 6.2s                                                                                  | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P18                                          | 44s                                                                                                                                                  | 6.2s                                                                                  | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P19                                          | 43s                                                                                                                                                  | 7.3s                                                                                  | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P20                                          | 45s                                                                                                                                                  | 7.3s                                                                                  | 62/10                                                                                                                                                                                                                                                                                                     | 66/10  | 70/10  | 76/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P21                                          | 48s                                                                                                                                                  | 12.2s                                                                                 | 60/7                                                                                                                                                                                                                                                                                                      | 61/8   | 62/10  | 66/10  |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P22                                          | 52s                                                                                                                                                  | 12.2s                                                                                 | 60/7                                                                                                                                                                                                                                                                                                      | 61/8   | 62/10  | 66/10  |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| P23                                          | 27s                                                                                                                                                  | 10.3s                                                                                 | 60/7                                                                                                                                                                                                                                                                                                      | 61/8   | 62/10  | 66/10  |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| Ceph (Zeit)                                  |                                                                                                                                                      |                                                                                       | 0,50 s                                                                                                                                                                                                                                                                                                    | 0,64 s | 0,64 s | 0,80 s |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |
| Ceph(kVmA)                                   |                                                                                                                                                      |                                                                                       | 73/9                                                                                                                                                                                                                                                                                                      | 73/9   | 76/9   | 83/9   |                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |

**Mögliche kV/mA-Wertepaare – manuell und automatisch von ABV anwählbar**

Possible kV/mA combinations – can be selected manually or automatically by AES

**Couples de valeurs kV/mA possibles – sélectionnables manuellement ou automatiquement par ABV**

Pares de valores de kV/mA posibles – seleccionable manual y automáticamente mediante ABV

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 60 | 60 | 61 | 61 | 61 | 62 | 64 | 66 | 68 | 70 | 73 | 76 | 80 | 83 | 90 | kV |
| 6  | 7  | 7  | 8  | 9  | 10 | 10 | 10 | 10 | 10 | 9  | 9  | 9  | 9  | 8  | mA |

**Mögliche kV/mA-Wertepaare – nur automatisch von ABV anwählbar**

Possible kV/mA combinations – can only be selected automatically by AES

**Couples de valeurs kV/mA possibles – seulement sélectionnables automatiquement par ABV**

Pares de valores de kV/mA posibles – sólo seleccionable automáticamente mediante ABV

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 61 | 62 | 62 | 62 | 62 | 64 | 66 | 68 | 70 | 71 | 74 | 77 | 81 | 83 | 89 | kV |
| 6  | 6  | 7  | 8  | 9  | 9  | 9  | 9  | 9  | 9  | 8  | 8  | 8  | 8  | 8  | mA |

# ORTHOPHOS 5 / Plus / CD D3200

## Programmwerte Program Values

## Valeurs de programme Valores de programa

**Verstärkungsfolien Kodak Lanex Regular (grün emittierend) mit Film Kodak T-Mat G / RA oder Agfa Dentus Ortholux.**  
**Intensifying Screen Kodak Lanex Regular (sensitive to green) with film Kodak T-Mat G / RA or Agfa Dentus Ortholux**  
**Écrans renforçateurs Kodak Lanex Regular (sensible au vert) avec film Kodak T-Mat G / RA ou Agfa Dentus Ortholux**  
**Hojas reforzadoras Kodak Lanex Regular (sensibles al verde) con película Kodak T-Mat G / RA o Agfa Dentus Ortholux**

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| ABV/P1                                              |                                                                                                                                                                |                                                                                               | 63/15                                                                                                                                                                                                                                                                                                              | 64/15  | 67/15  | 72/14  | 63/15                                                                                                                                                                                                                                                                                                                                                                                                                                          | 64/15 | 67/15 | 72/14 |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|
| Programm<br>Program<br><i>Programme</i><br>Programa | Programm-<br>ablaufzeit ca.<br>Program<br>duration approx.<br><i>Temps d'<br/>exécution de<br/>progr. env.</i><br>Tiempos de<br>ciclos de pro-<br>grama aprox. | Aufnahmezeit<br>max.<br>Exposure time<br><i>Temps<br/>de pose</i><br>Tiempos de<br>exposición | Vom Werk programmierte Werte bei<br>Schwärmungsschalterstellung 03<br>Factory-programmed values with a film<br>density of 03<br><i>Valeurs programmées à l'usine avec<br/>position du commutateur de<br/>noircissement 03</i><br>Valores programados desde fábrica en la<br>posición 03 del conmutador de densidad |        |        |        | Frei programmierte Werte oder Werte bei<br>verändertem Schwärmungsangleich:....<br>– hier eintragen –<br>Freely programmed values or values with other film<br>density:.... – please enter here –<br><i>Valeurs librement programmées ou valeurs<br/>avec correction du noircissement modifiée: ....</i><br>– inscrire ici –<br>Valores libremente programados o valores en caso de<br>adaptación de densidad modificada: .... – anotar aquí – |       |       |       |
|                                                     |                                                                                                                                                                |                                                                                               |                                                                                                                                                                                                                                                                                                                    |        |        |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P1                                                  | 24s                                                                                                                                                            | 14.1s                                                                                         | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P2                                                  | 24s                                                                                                                                                            | 11.8s                                                                                         | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P3                                                  | 54s                                                                                                                                                            | 16.2s                                                                                         | 60/16                                                                                                                                                                                                                                                                                                              | 63/16  | 64/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P4                                                  | 26s                                                                                                                                                            | 8.1s                                                                                          | 61/16                                                                                                                                                                                                                                                                                                              | 63/16  | 64/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P5                                                  | 28s                                                                                                                                                            | 10.1s                                                                                         | 63/16                                                                                                                                                                                                                                                                                                              | 64/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P6.1+P6.2                                           | 27+27s                                                                                                                                                         | 12.8s                                                                                         | 63/16                                                                                                                                                                                                                                                                                                              | 64/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P7.1+P7.2                                           | 27+27s                                                                                                                                                         | 18.7s                                                                                         | 63/16                                                                                                                                                                                                                                                                                                              | 64/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P8                                                  | 108s                                                                                                                                                           | 25.3s                                                                                         | 63/16                                                                                                                                                                                                                                                                                                              | 64/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P9                                                  | 94s                                                                                                                                                            | 22.9s                                                                                         | 63/16                                                                                                                                                                                                                                                                                                              | 64/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P10                                                 | 24s                                                                                                                                                            | 11.8s                                                                                         | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P11                                                 | 19s                                                                                                                                                            | 14.4s                                                                                         | 61/16                                                                                                                                                                                                                                                                                                              | 63/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P12                                                 | 20s                                                                                                                                                            | 4.9s                                                                                          | 64/16                                                                                                                                                                                                                                                                                                              | 68/15  | 71/15  | 74/14  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P13                                                 | 23s                                                                                                                                                            | 14.4s                                                                                         | 64/16                                                                                                                                                                                                                                                                                                              | 68/15  | 71/15  | 80/14  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P14                                                 | 24s                                                                                                                                                            | 8.1s                                                                                          | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P15                                                 | 24s                                                                                                                                                            | 8.1s                                                                                          | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P16                                                 | 95s                                                                                                                                                            | 21.4s                                                                                         | 66/16                                                                                                                                                                                                                                                                                                              | 68/15  | 71/15  | 74/14  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P17                                                 | 41s                                                                                                                                                            | 6.2s                                                                                          | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P18                                                 | 44s                                                                                                                                                            | 6.2s                                                                                          | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P19                                                 | 43s                                                                                                                                                            | 7.3s                                                                                          | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P20                                                 | 45s                                                                                                                                                            | 7.3s                                                                                          | 60/12                                                                                                                                                                                                                                                                                                              | 60/16  | 63/16  | 66/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P21                                                 | 48s                                                                                                                                                            | 12.2s                                                                                         | 60/9                                                                                                                                                                                                                                                                                                               | 60/10  | 60/14  | 61/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P22                                                 | 52s                                                                                                                                                            | 12.2s                                                                                         | 60/9                                                                                                                                                                                                                                                                                                               | 60/10  | 60/14  | 61/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| P23                                                 | 27s                                                                                                                                                            | 10.3s                                                                                         | 60/9                                                                                                                                                                                                                                                                                                               | 60/10  | 60/14  | 61/16  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| Ceph (Zeit)                                         |                                                                                                                                                                |                                                                                               | 0,40 s                                                                                                                                                                                                                                                                                                             | 0,50 s | 0,64 s | 0,80 s |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |
| Ceph(kVmA)                                          |                                                                                                                                                                |                                                                                               | 64/16                                                                                                                                                                                                                                                                                                              | 64/16  | 66/16  | 68/15  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |       |

**Mögliche kV/mA-Wertepaare – manuell und automatisch von ABV anwählbar**

Possible kV/mA combinations – can be selected manually or automatically by AES

**Couples de valeurs kV/mA possibles – sélectionnables manuellement ou automatiquement par ABV**

Pares de valores de kV/mA posibles – seleccionable manual y automáticamente mediante ABV

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 60 | 60 | 60 | 60 | 60 | 60 | 61 | 62 | 63 | 64 | 66 | 68 | 71 | 74 | 80 | kV |
| 9  | 10 | 11 | 12 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 15 | 14 | 14 | mA |

**Mögliche kV/mA-Wertepaare – nur automatisch von ABV anwählbar**

Possible kV/mA combinations – can only be selected automatically by AES

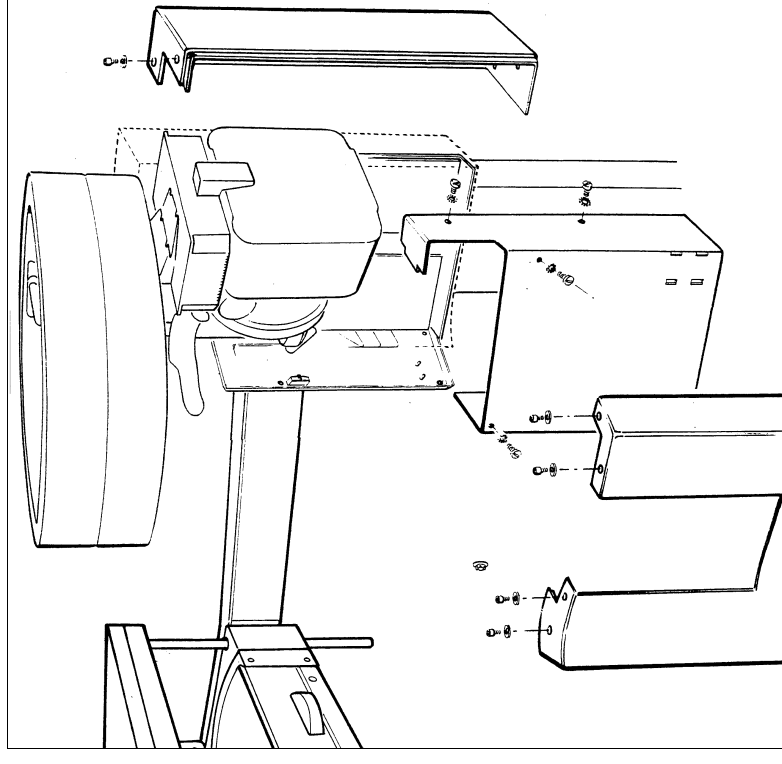
**Couples de valeurs kV/mA possibles – seulement sélectionnables automatiquement par ABV**

Pares de valores de kV/mA posibles – sólo seleccionable automáticamente mediante ABV

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 61 | 61 | 61 | 61 | 61 | 61 | 62 | 63 | 64 | 65 | 67 | 69 | 72 | 75 | 81 | kV |
| 9  | 10 | 11 | 12 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 14 | 14 | 13 | 13 | mA |

## ORTHOPHOS 5 / Plus / Plus Ceph ORTHOPHOS Plus DS / Plus DS Ceph

Schrauben für Blechabdeckung  
Screws for Sheet-Metal Cover  
Vis pour l'habillage métallique  
Tornillos para la cobertura de chapa



Auf Grund verbesserter EMV\*-  
Maßnahmen werden von den  
zur Zeit 32 Befestigungslöchern  
der Abdeckhaube **A** nur noch 5  
benötigt.

\* = Elektro-magnetische-Verträglichkeit

Due to the improved EMC\*  
measures, only 5 of the existing  
32 mounting holes in cover **A**  
are required.

\* = electromagnetic compatibility

Grâce aux mesures de CEM\*  
améliorées, seuls 5 des 32 trous  
de fixation de l'habillage **A** sont  
encore nécessaires.

\* = compatibilité électromagnétique

Debido a las medidas CEM\*  
perfeccionadas, de los 32 agujeros  
de fijación actuales de la  
cubierta de chapa **A** tan sólo se  
precisan 5.

\* = Compatibilidad electromagnética



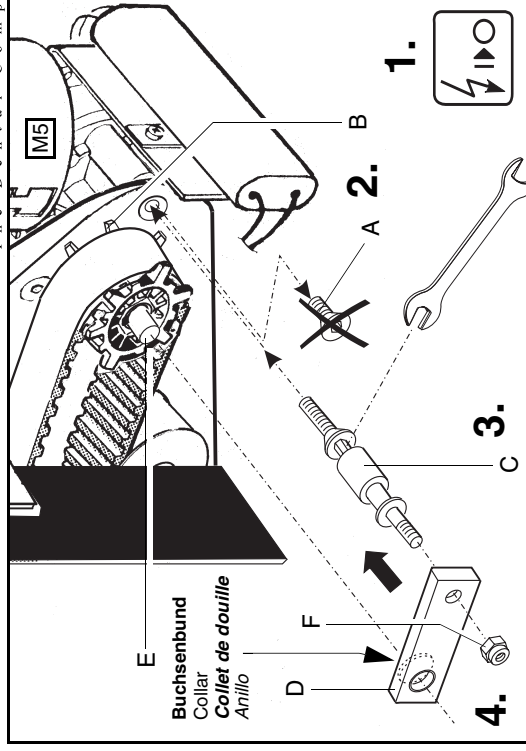
## ORTHOPHOS 5 / PLUS / CD ORTHOPHOS DS

### Einbau Zahnriemensicherung

Installing the toothed belt retaining device

Montage sécurité courroie dentée verrou

Montaje de la protección de la correa dentada



#### 9. Gerät ausschalten.

Switch off unit.

#### 10. Schraube (A) herausschrauben und entfernen. (Vorher evtl. Zahnrolle (B) vorstellen).

Loosen screw (A) and remove (first reposition toothed roller if necessary).

#### 11. Bolzen (C) in die freie Gewindebohrung eindrehen und mit Gabelschlüssel (nicht im Lieferumfang) festziehen.

Turn bolt (C) into open threaded sleeve and tighten with open-end wrench (not included in scope of supply).

#### 12. Riegel (D) mit Buchsenbund nach vorne auf Motorachse (E) und auf Bolzen (C) stecken. Mit Mutter (F) sichern.

Attach locking bar (D) with collar facing motor axle (E), mounted on bolt (C). Secure with counternut (F).

Mettre l'appareil hors circuit.

Sortir et retirer la vis (A). (Le cas échéant, ajuster préalablement la roue dentée (B)).

Engager le boulon (C) dans le taraudage vacant et le serrer à l'aide d'une clé à fourche (non comprise à la livraison).

Engager le verrou (D), le collet de douille étant dirigé vers l'avant, sur l'axe du moteur (E) et le boulon (C). Bloquer avec l'écrou (F).

Desconectar el aparato.

Destornillar y retirar el tornillo (A) (desplazar previamente la polea dentada (B), si es preciso).

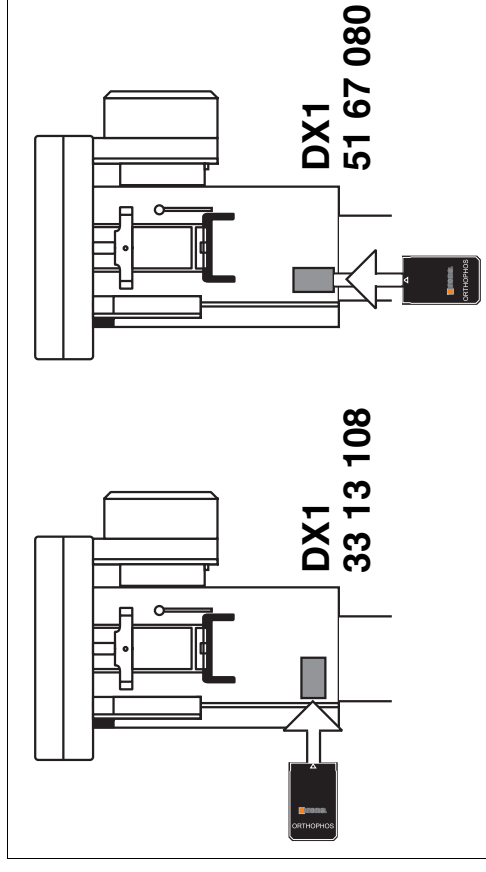
Atornillar el perno (C) en el orificio roscado que ha quedado libre y apretarlo con la llave de boca (no incluida en el suministro).

Introducir el cerrojo (D), con el anillo delante, en el árbol del motor (E) y en el perno (C). Fijarlo con la tuerca (F).



# ORTHOPHOS Plus / Plus DS Ceph ORTHOPHOS Plus DS / Plus DS Ceph

## DX1 tauschen Replacing DX1 Echange de DX1 Cambiar DX1



### Durchzuführende Arbeiten:

- Bei ORTHOPHOS Plus DS / Plus DS Ceph ab Memory Card V031: Vor dem Tausch der DX1 kVmA Stufenreihe ermitteln, dazu Service-Routine S.25 anwählen und auf der mA-Anzeige Kennziffer ablesen.  
(Sollte dies nicht mehr möglich sein: Mit SIDEXIS aus der Bildzusatzinformation das letzte kVmA-Wertepaar einer Panorama-Aufnahme ermitteln.)
- Neue DX1 einbauen. Alle Stecker bis zum Einrasten aufstecken. Memory Card von alter DX1 auf neue stecken.

### Work to be performed:

- With ORTHOPHOS Plus DS / Plus DS Ceph from Memory Card V031: Before replacing DX1 determine the step series by selecting Service Routine S.25 and reading out the code number from the mA display.  
(In case this is no longer possible: With SIDEXIS, determine the last kV-mA value pair for a Panorama exposure from the additional image information.)
- Insert the new DX1. Make sure that all plugs are fully engaged. Plug the memory card from the old DX1 to the new one.

### Travaux à effectuer:

- Pour ORTHOPHOS Plus DS / Plus DS Ceph à partir de la carte mémoire V031: Avant l'échange de DX1, déterminer les paliers kV/mA; sélectionner à cet effet la routine S.A.V. S.25 et lire l'indice sur l'affichage mA.  
(Si cette opération n'est plus possible: déterminer avec SIDEXIS le dernier couple de valeurs kV/mA d'une radiographie panoramique.)
- Enficher tous les connecteurs jusqu'à l'encenchement. Enficher la carte mémoire de l'ancienne DX1 sur la nouvelle.

### Pasos a seguir:

- En el ORTHOPHOS Plus DS / Plus DS Ceph a partir de la Memory Card V031: Determine la serie de valores estandar kVmA antes de reemplazar la DX1. Para ello seleccione la rutina de servicio S.25 y lea el indicativo indicado de mA.  
(Si ello ya no fuera posible: Determinar por medio de SIDEXIS en la información adicional de la imagen el último par de valores de kVmA de una radiografía panorámica.)
- Monte la DX1 nueva. Conecte todas las clavijas hasta que queden completamente encajadas. Conecte la Memory Card de la DX1 antigua a la nueva.

- Gerät einschalten. Nach Selbstjustage Einstellungen gemäß Kapitel **Platine DX1 einstellen** durchführen, siehe Service-Handbuch.

- Zusätzlich bei ORTHOPHOS Plus DS / Plus DS Ceph ab Memory Card V031: Service-Routine S.25 Film-Folien System bzw. kVmA-Stufenreihe einstellen anwählen. Ermittelte Kennziffer einstellen.  
**1A** Stufenreihe 60/9 - 90/12  
**2A** Stufenreihe 60/3 - 90/6 (Standard nach erstem Einschalten)

- Switch on the unit. After the self adjustment, perform the adjustments according to the section **Setting Board DX1**, see Service Manual.

- In addition with ORTHOPHOS Plus DS / Plus DS Ceph from Memory Card V031: Select Service Routine S.25 Setting film-screen system or kV-mA step series. Set the code number determined.  
**1A** step series 60/9 - 90/12  
**2A** step series 60/3 - 90/6 (standard after initial switch-on)

- Mettre l'appareil en marche. Après l'auto-réglage, procéder aux réglages du chapitre **Régler la carte DX1**, cf. Manuel d'entretien.

- En plus pour ORTHOPHOS Plus DS / Plus DS Ceph à partir de la carte mémoire V031: Sélectionner la routine S.A.V. S.25 système film-écran ou régler les paliers kV/mA. Régler l'indice déterminé.  
**1A** palier 60/9 - 90/12  
**2A** palier 60/3 - 90/6 (standard après la première mise en marche)

- Ponga en marcha el equipo. Después del autoajuste efectúe los ajustes según el capítulo **Ajustar platina DX1**, ver Manual de Servicio.

- Adicionalmente en el ORTHOPHOS Plus DS / Plus DS Ceph a partir de la Memory Card V031: Elija la rutina de servicio S.25 sistema película-pantalla o determinación de serie de intervalos de kV/ mA. Introduzca el indicativo obtenido previamente.  
**1A** serie de valores estandar 60/9 - 90/12  
**2A** serie de valores estandar 60/3 - 90/6 (standard tras el primer encendido)

- Die DX1 ist jetzt auf den Röntgenstrahler eingestellt. Alle frei programmierten Werte sind gelöscht und müssen neu programmiert werden. Alle Abschirmbleche anbringen!

- The DX1 is then matched to the X-ray tube assembly. All freely programmed values are erased and must be reprogrammed. Attach all protective shielding plates!

- La DX1 est alors réglée sur le tube radiogène. Toutes les valeurs programmées librement sont effacées et doivent être reprogrammées. Monter les tôles de blindage!

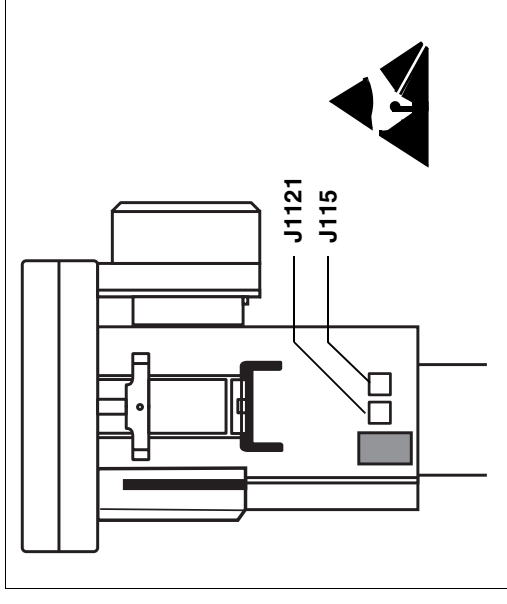
- DX1 está ajustada ahora al emisor de rayos X. Todos los valores libremente programados se han borrado y hay que programarlos de nuevo. ¡Montar todas las chapas de blindaje!





## ORTHOPHOS Plus / Plus Ceph

Austausch des EEPROMs J115 und des GAL J1121 auf der DX1  
 Replacing the EEPROM J115 and GAL J1121 on board DX1  
 Remplacement de EEPROM J115 et de GAL J1121 sur la carte DX1  
 Sustitución de EEPROM J115 y de GAL J1121 en la DX1



### Tausch des EEPROMs J115 bis Software-Version 04.50 / 05.52

1. Das Gerät ausschalten. EGB Richtlinien beachten.
2. Frontverkleidung und Elektronikabdeckung abschrauben.
3. **EEPROM J115** (Boot-SW) und **GAL J1121** auf der **DX1** tauschen.
4. Elektronikabdeckung und Frontverkleidung anschrauben.
5. Gerät einschalten. Nach Selbstjustage Einstellungen gemäß Kapitel **Platine DX1 einstellen** durchführen, siehe Service-Handbuch.

### Replacing the EEPROM J115 up to software version 04.50 / 05.52

1. Switch the unit off. Observe the ESD guidelines.
2. Unscrew and remove the front panel and the cover of the electronics unit.
3. Replace **EEPROM J115** (Boot-SW) and **GAL J1121** on board **DX1**.
4. Screw on the cover of the electronics unit and the front panel.
5. Switch on the unit. After the self adjustment, perform the adjustments according to the section **Setting Board DX1**, see Service Manual.

### Remplacement de EEPROM jusqu'à la version logicielle 04.50 / 05.52

1. Arrêter l'appareil. Tenir compte des directives relatives à la compatibilité électromagnétique.
2. Dévisser l'habillage à l'avant et le cache de l'électronique.
3. Remplacer **EEPROM J115** (Boot-SW) et **GAL J1121** sur la carte **DX1**.
4. Revisser le cache de l'électronique et l'habillage de la face avant.
5. Mettre l'appareil en marche. Après l'auto-réglage, procéder aux réglages du chapitre **Régler la carte DX1**, cf. Manuel de maintenance.

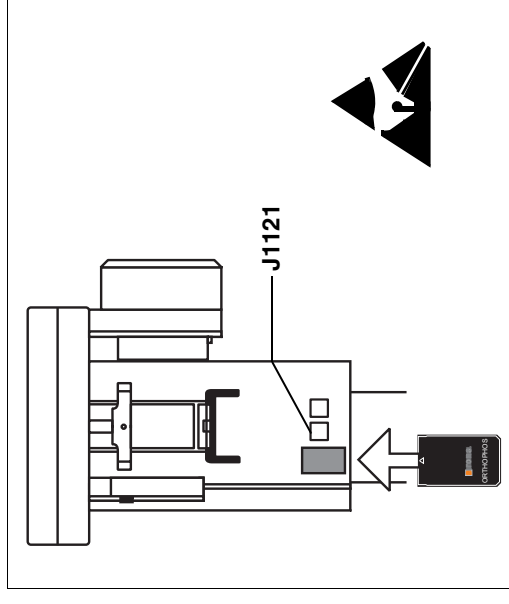
### Cambio de EEPROM J115 hasta la versión de software 04.50 / 05.52

1. Desconecte el equipo. Siga las normas sobre elementos sensibles a descargas electrostáticas.
2. Desatornille el revestimiento frontal y la cubierta de la unidad electrónica.
3. Cambie **EEPROM J115** (Boot-SW) y **GAL J1121** en la **DX1**.
4. Atornille la cubierta de la unidad electrónica y el revestimiento frontal.
5. Ponga en marcha el equipo. Después del autoajuste efectúe los ajustes según el capítulo **Ajustar platina DX1**, ver Manual de Servicio.





## ORTHOPHOS Plus DS / Plus DS Ceph



Austausch der Memory Card und des GAL J1121 auf der DX1  
Replacing the memory card and GAL J1121 on board DX1



### Tausch der Memory-Card bis Software-Version 06.10 / 03.12

1. Das Gerät ausschalten. EGB Richtlinien beachten.
2. Frontverkleidung und Elektronikabdeckung abschrauben.
3. Memory Card und **GAL J1121** auf der **DX1** tauschen.
4. Elektronikabdeckung und Frontverkleidung anschrauben. Gerät einschalten.
5. **Software-Update des EEPROMS J115 mit der Service-Routine S.24**
  - Service-Routine anwählen. → Wie im Service-Handbuch beschrieben
  - Service-Code 24 eingeben. → Auf der kV-Anzeige leuchtet **24**.
  - Die Service-Taste  kurz drücken. → LED über der Memory-Taste blinkt und auf der kV/mA-Anzeige wird **00** angezeigt.
  - Die Memory-Taste drücken. → LED blinkt nicht mehr.  
Die LED über der Taste **R** blinkt.
  - Die Rücklauffaste **R** drücken. → LED blinkt nicht mehr. Boot-Software wird aktualisiert und an der kV/mA-Anzeige wird **FF** angezeigt. LED über Servicetaste leuchtet.
  - Die Service-Taste  kurz drücken. → LED über Servicetaste und kV/mA-Anzeige leuchtet nicht mehr.  
Die Service-Routine S.24 wird verlassen.

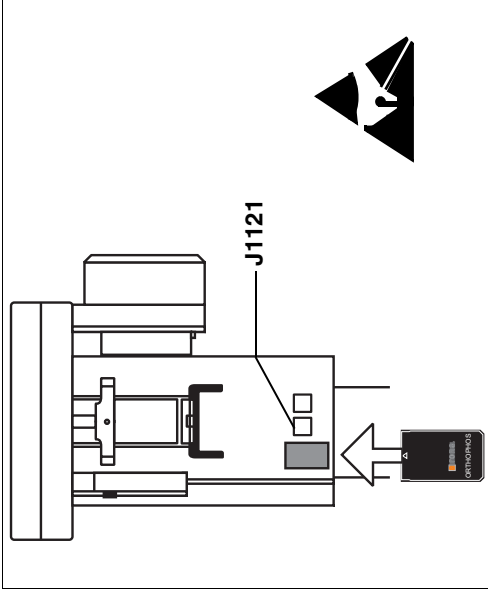
### Replacing the memory card up to software version 06.10 / 03.12

- Switch the unit off. Observe the ESD guidelines.
- Unscrew and remove the front panel and the cover of the electronics unit.
- Replace the memory card and **GAL J1121** on board **DX1**.
- Screw on the cover of the electronics unit and the front panel. Switch the unit on.
- Software update of EEPROM J115 with service routine S.24**
  - Select the service routine. → Proceed as described in the service manual.
  - Enter service code 24. → **24** lights up on the kV display.
  - Press the Service key  briefly. → The LED above the Memory key starts flashing and **00** appears on the kV/mA display.
  - Press the Memory key. → The LED stops flashing.
  - Press Return key **R**. → The LED above the **R** key starts flashing.
  - Press the Service key  briefly. → The LED stops flashing. The boot software is updated and **FF** appears on the kV/mA display. The LED above the Service key lights up.
  - Press the Service key and the kV/mA display are no longer illuminated. The program quits service routine S.24.

# ORTHOPHOS Plus DS / Plus DS Ceph

Remplacement de la carte mémoire et de GAL J1121 sur la carte DX1

Sustitución de la tarjeta de memoria y de GAL J1121 en la DX1



## Remplacement de la carte mémoire jusqu'à la version logicielle 06.10 / 03.12

1. Arrêter l'appareil. Tenir compte des directives relatives à la compatibilité électromagnétique.
2. Dévisser l'habillage à l'avant et le cache de l'électronique.
3. Remplacer la carte mémoire et **GAL J1121** sur la carte **DX1**.
4. Revisser le cache de l'électronique et l'habillage de la face avant. Mettre l'appareil en marche.

## 5. Mise à jour logicielle de l'EEPROM J115 avec la routine SAV S.24

- Sélectionner la routine SAV. → cf. description dans le manuel SAV
- Entrer le code SAV 24. → La valeur **24** apparaît sur l'afficheur kV.
- Appuyer brièvement sur la touche SAV → La DEL au-dessus de la touche Memory clignote, et la valeur "00" apparaît sur l'afficheur kV/mA.
- Appuyer sur la touche Memory. → La DEL ne clignote plus. La DEL au-dessus de la touche **R** clignote.
- Appuyer sur la touche retour R. → La DEL ne clignote plus. Le logiciel de chargement est actualisé et l'afficheur kV/mA indique "FF". La DEL au-dessus de la touche SAV est allumée.
- Appuyer brièvement sur la touche SAV → La DEL au-dessus de la touche SAV et l'afficheur kV/mA s'éteignent. Fin de la routine SAV S.24.

## Cambio de la tarjeta de memoria hasta la versión de software 06.10 / 03.12

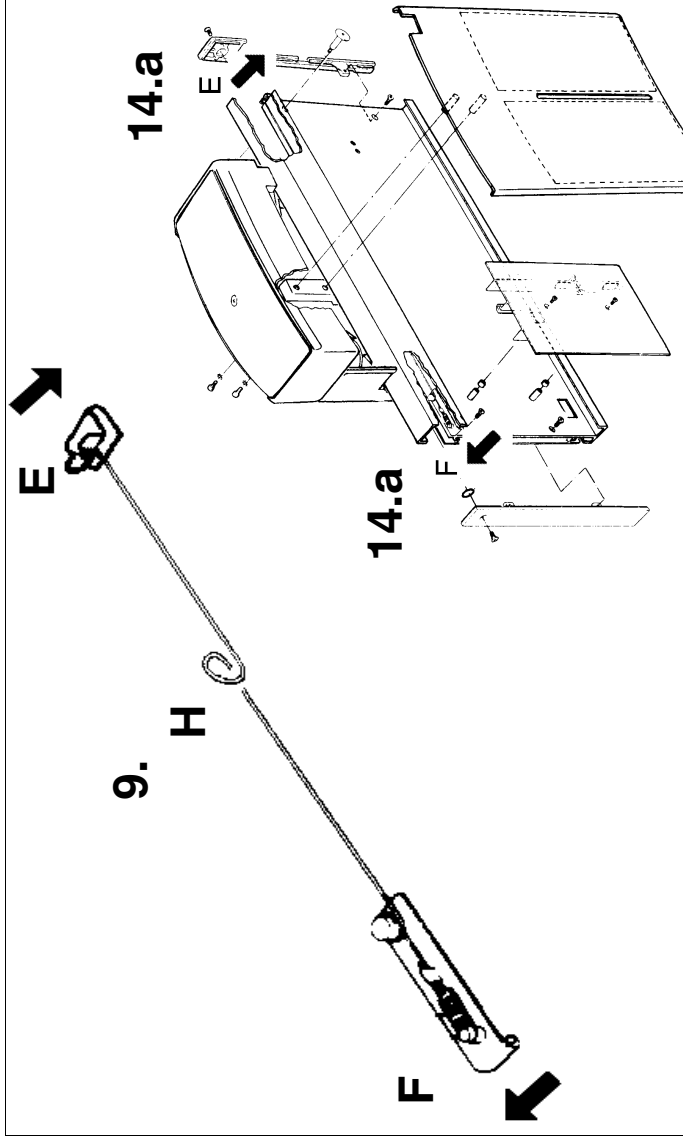
- Desconecte el equipo. Siga las normas sobre elementos sensibles a descargas electrostáticas.
- Desatornille el revestimiento frontal y la cubierta de la unidad electrónica.
- Cambie la tarjeta de memoria y **GAL J1121** en la **DX1**.
- Atornille la cubierta de la unidad electrónica y el revestimiento frontal. Conecte el equipo.

## Actualización del software de las EEPROMS J115 con Rutina de Servicio Técnico S.24

- Seleccione Rutina de Servicio. → Como se describe en el Manual de Servicio
- Teclee el código de Servicio 24. → En el indicador de kV se enciende **24**.
- Pulse brevemente la tecla de Servicio → El LED situado sobre la tecla de memoria parpadea y el indicador kV/mA muestra **00**.
- Pulse la tecla de memoria. → El LED deja de parpadear.
- Pulse la tecla de retorno **R**. → El LED situado sobre la tecla **R** parpadea.
- Pulse brevemente la tecla de Servicio → El LED deja de parpadear. El software de arranque se actualiza y el indicador kV/mA muestra **FF**. El LED situado sobre la tecla de Servicio se enciende.
- Pulse brevemente la tecla de Servicio → El LED situado sobre la tecla de Servicio y el indicador kV/mA ya no se enciende. Se sale de Rutina de Servicio S.24.

## ORTHOPHOS 3/5/Plus

Seil austauschen  
Replacing the rope  
Remplacement du câble  
Cambiar el cable



### Ergänzungen zum Kapitel „Seil und/oder Kassettenantriebsmotor austauschen“

- Gerät AUS-schalten und Kassettenhalter wie im Service-Handbuch beschrieben auseinanderbauen.
- Neues Seil als Schlinge **H**, wie im Bild gezeigt, um Führungsnut des Antriebsrades legen und in Haltebleche **E** und **F** einhängen.
- Kassettenhalter wieder zusammenbauen wie im Service-Handbuch beschrieben.

**14.a** Haltebleche **E** und **F** jeweils in Pfeilrichtung bis an den Anschlag schieben.

### Supplements to the chapter on "Replacing the rope and/or the cassette drive motor"

- Switch the unit OFF and dismantle the cassette holder as described in the service manual.
- Lay new rope in guide groove of drive wheel as loop **H** as shown in the drawing and hook it up to retaining plates **E** and **F**.

Reassemble the cassette holder as described in the service manual.

Slide retaining plates **E** and **F** in the direction of the arrow up to their stops.

### Compléments du chapitre „Echanger le câble et/ou le moteur d'entraînement de cassette“

Mettre l'appareil à l'ARRET et déassembler le porte-cassette comme décrit dans le manuel de SAV

Faire passer un nouveau câble en formant une boucle **H** comme décrit sur la figure autour de la rainure de guidage du pignon d'entraînement et accrocher le câble dans les tôles de fixation **E** et **F**.

Assembler à nouveau le porte-cassette comme décrit dans le manuel de SAV.

Repousser les tôles de fixation **E** et **F** dans le sens de la flèche jusqu'en butée.

### Anexo al capítulo „Cambiar cable y/o motor de accionamiento del chasis“

DESconecte el equipo y desmonte el portachasis como se indica en el Manual de mantenimiento.

Coloque el cable nuevo como un lazo **H** alrededor de la ranura de guía del piñón y engánchela en las chapas soporte **E** y **F** como muestra la figura.

Vuelva a montar el portachasis como se indica en el Manual de mantenimiento.

Deslice las chapas soporte **E** y **F** hasta el tope en el sentido de la flecha.



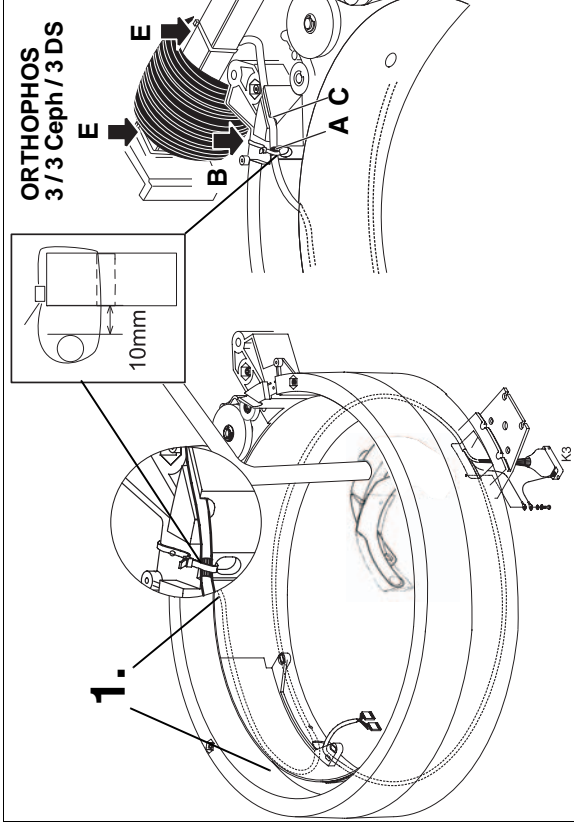
## ORTHOPHOS 3 / 3 Ceph / 3 DS ORTHOPHOS Plus / Plus Ceph ORTHOPHOS Plus DS / Plus DS Ceph

Ringkabel L4/L10 austauschen

Replacing ring cable L4/L10

Echanger le câble de l'anneau L4/L10

Cambiar el cable anular L4/L10



### ACHTUNG

- Ringkabel austauschen, siehe Service-Handbuch Kapitel Reparatur.
- 1. Fetten Sie das Ringkabel in diesem Bereich mit beiliegendem Fett.
- ! Vorsicht kein Fett an den Flachriemen bringen.

### ATTENTION

- Replacing ring cable, see Service Manual chapter Repairs.
- Grease the ring cable in this area with the grease included.
- Be careful that no grease gets on the flat belt.

### ATTENTION

- Echanger le câble de l'anneau, voir Manuel de maintenance chapitres Reparation.
- Graisser le câble de ceinture dans cette région à l'aide de la graisse jointe.
- Veiller à ne pas graisser la courroie plate.

### ATENCIÓN

- Cambiar el cable anular, véase Manual de Servicio capítulo Reparación.
- Unte el cable anular en esta zona con la grasa adjunta.
- Tenga cuidado de no untar la correa plana.

- **ORTHOPHOS 3/3 Ceph bis Serien-Nr. 7 999**

Legen Sie die Geräteseite des Ringkabels in die Vertiefung **C** am Ring ein. Fixieren Sie das Ringkabel mit einem Kabelbinder **B**, mit ca. 10mm Spiel, an der Markierung **A**.  
Legen Sie das Kabel hinter den Bolzen und befestigen Sie es mit 2 Kabelbindern **E** am Ringträger (grüne Markierung unter Kabelbinder). Das Kabel muss am Ringträger fest anliegen.

- **ORTHOPHOS 3/3 Ceph Up to Serial-No. 7 999**

Insert the unit side of the ring cable into the recess **C** in the ring. Fix the ring cable with a cable tie **B**, with approx. 10 mm play, at the mark **A**.  
Lay the cable behind the bolt and fasten it with 2 cable ties **E** to the ring carrier (green mark beneath cable tie). The cable must rest firmly against the ring carrier.

- **ORTHOPHOS 3/3 Ceph Jusqu'au n° série 7 999**

Engager l'extrémité côté appareil du câble de l'anneau dans le renforcement **C** sur l'anneau. Fixer le câble avec un collier **B**, avec env. 10mm de jeu, au niveau du repère **A**.  
Poser le câble derrière l'axe et le fixer avec 2 colliers **E** sur le support de l'anneau (repère vert sous les colliers). Le câble doit être bien appliqué au niveau du support de l'anneau.

- **ORTHOPHOS 3/3 Ceph Hasta No de serie 7 999**

Introduzca el lado del cable anular correspondiente al equipo en la concavidad **C** del anillo. Fijelo mediante una brida de cable **B**, con holgura de aprox. 10mm, en la marca **A**.  
Instale el cable por detrás del perno y fíjelo mediante 2 bridas de cable **E** en el soporte del anillo (marca verde por debajo de la brida de cable). El cable debe estar en estrecho contacto con el soporte del anillo.







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We reserve the right to make any alterations which may be due to technical improvements.

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